Dr. Branislav Dozet

Flight Above the Sunflower Field

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Author's Note

I haven't, and it is likely that I won't manage to visit many places on Earth where sunflowers grow. But that's not so important. Reading about them and imagining them is just as good as having been there.

Chapters

Australia 11

Africa 25

South America 43

North America 61

Asia 91

Europe 125

Mars 157

Biography 167

Reviewer's Note

Two years ago, an unusual book appeared – *A Stroll Through the Sunflower Field*. The author, Dr. Branislav Dozet, took us on an extraordinary journey through time and space, a journey whose leading theme was the sunflower. Traveling in the footsteps of this beautiful plant and one of the world's most essential oilseeds, we met many people who had dedicated their lives to it, some almost forgotten, encountered ancient legends, and even learned numerous culinary recipes featuring it from all over the world. Dr. Branislav Dozet, a scientist who has devoted his working life to improving sunflower and who has traveled the planet in their pursuit, opened a window for us into an unusual world where extraordinary human biographies and incredible landscapes marked by the beautiful yellow sunflower intertwine. Some of the stories he brought us he experienced himself, some he gathered from conversations with many people he met on his life's journey, and many he found in professional and popular literature, and even in newspaper articles from around the world. Even then, the author announced sequels, hinting that there was still much to tell about the sunflower.

And now, before us is the second part of this unusual adventure – *Flight Above the Sunflower Field*, presented in 7 exciting chapters. As the title suggests, we've shifted our viewing angle, traveling across the continents because the sunflower

is a true cosmopolitan, found everywhere except Antarctica (though, if the current trend of melting continues, its presence there isn't excluded). From Australia to Africa, both Americas, Asia, and Europe – where it is most widely cultivated today – the sunflower has captivated someone, marked someone's life, either as an agricultural crop, a source of oil and protein, or simply as an inexhaustible source of beauty. First and foremost, it captivated the author of this book, who, searching for the sunflower, recalls not only everything he saw and read, but also his childhood, his upbringing, and the emotions these journeys evoked. On this journey, we will meet many ordinary people with extraordinary fates, forgotten scientists and enthusiasts, but also Fangio, Freddie Mercury, and other famous personalities who found themselves within Branislav's flight above the sunflower field and in his memories and reflections. The sunflower even offered comfort in great tragedies, from the death of Australian passengers in a plane crash in Ukraine in 2014 to the story from the youth of the famous Nazi hunter Simon Wiesenthal – one of the most beautiful and certainly the most touching in this book.

The author has also shared with us some of his professional experiences and recommendations, as well as ancient myths he encountered in his research. Of course, there are also many new recipes for those who want to try something beautiful and exotic. In the end, he also soared much higher, above the clouds, beyond the atmosphere, all the way to Mars, and told us about space programs that deal with sunflower and the possible application of this plant in the not-so-distant future. I won't reveal more; I suggest we fasten our seatbelts and take off on a new adventure that awaits us.

Dr. Vladimir Miklič

In this day and age of digital guides and influencers, there are still enthusiasts of analog travel for their thoughts and reflections. It's nicer and easier to fly from continent to continent when you don't fly alone. Or, if you fly alone, it's easier with a book. Dr. Branislav Dozet, captain, pilot, and writer on this *Flight Above the Sunflower Field*, seeks and finds a connection between the beauty of written words and the power of science and nature around us. The sunflower has been in the eyes and minds of people since the beginning of written human civilization. In different ways, it has been part of the lives of many people who have described it, cultivated it, and admired its beauty, but also changed and adapted it over time to match their needs and desires.

All the short stories on this flight through space and time are connected to the sunflower and its influence on both small and large human communities and individuals throughout the history of civilizational development. From joy to sorrow and from happenstance to misfortune - our captain connects it all in this Flight Above the Sunflower Field. He tells us stories meant to wake us up in the morning and to help us go to sleep at night. The ones you know you can read a bit fatter, and then you can take your time with the new ones. Enjoy!

Dr. Dejan Jovnović

Dr. Branislav Dozet dedicated his professional and life's work to creating sunflower hybrids, spreading sunflower around the world, as well as increasing production potential and improving agricultural technology. He is, indeed, an ambassador for sunflower cultivation. In his book, *Flight Over the Sunflower Fields*,

Dr. Branislav Dozet weaves a story about distant continents and countries, about people similar to us in our everyday lives, but also about the great figures of the world whose lives and fates are connected to the sunflower plant.

In *Flight Over the Sunflower Fields*, the author not only tells the history of sunflower cultivation on the continents from an agronomic or breeding perspective but intertwines it with interesting stories and the fates of people.

It's difficult to single out a story that impresses more, but what certainly remains is a noble emotion of empathy and understanding that connects the stories of the "seed of memory" for the victims of the plane crash, the sunflower's significance for Nelson Mandela, and the reflections of Simon Wiesenthal. At the same time, he was a prisoner in a concentration camp.

In this book, the author helps us get to know the forgotten, but also the discreet heroes of his community – Miloš Milošević Marić, Dr. Zoltan Horvat, Fiona Mutesi, and many others.

The author's story is layered and complex, and the sunflower, like Sumatra in the work of our great Miloš Crnjanski, "emphasizes the interconnectedness of the most distant spatial-temporal elements of material and spiritual reality, referring to a world of heightened senses, through synesthetic simultaneity" as Sumatraism was defined by Bojana Stojanović Pantović (*The Legacy of Sumatraism,* Rad, Belgrade, 1998, p. 13). I will allow myself the freedom to call Dr. Branislav Dozet's approach in the book *Flight Over the Sunflower Fields* "sunflowerism."

Dr. Pavle Sklenar

Australia

This continent is rarely mentioned in the stories about the sunflower. I didn't start in alphabetical order; Australia simply came to mind first. And so this book began with Australia.

A continent so distant and mysterious, especially in the history of humanity, and it is somewhere in that story that our sunflower is also located. Australia is a continent that was first inhabited more than 50,000 years ago. When the English arrived in Australia in 1788, more than 350,000 indigenous people already lived there and spoke in some 250 languages and dialects.

In antiquity, it was theorized that there was some undiscovered southern land, and they named it thus in Latin: ***Terra australis incognita.*** Hence, today's name. To reach it from Europe, it was necessary to travel 20,000 km. Australia is the smallest, oldest, flattest, but also the driest continent on the planet. Before the colonization of Australia, indigenous settlers already lived there. The most famous among them are the Aboriginal people.

The first sailors to set foot on the shores of present-day Australia were the Dutch under the command of Willem Janszoon. They drew maps, called it New Holland, and left. But James Cook did not miss the opportunity in 1770 to sail around the east coast of this new continent, chart it on the world map, call it New South Wales, and declare it the possession of Great Britain. Isolated on all sides, it served Great Britain to send large groups of prisoners

there to serve their deserved (or undeserved) punishment. Exactly on January 26, 1788, a settlement was formed in Port Jackson in New South Wales. That day is still considered Australia Day. Today's Tasmania, and then Van Diemen's Land, in the first half of the 19th century, became a separate colony, for Great Britain to soon establish full control over the western part of Australia as well. The colonization of Australia in that period also led to a significant reduction in the population of the indigenous people.

In 1992, not that long ago, all told, the landmark Mabo v Queensland case overturned the previously held interpretation that Australia was ***terra nullius*** – empty land – at the time of European arrival. Every year on June 3rd, Mabo Day is celebrated in Australia, honouring Edward Koiki Mabo, a Mer Island man and a legend of Australia.

Interesting fact: Edward Koiki Mabo was born in 1936, the fourth of his family's children, on Mer Island. His mother died when he was young, and his uncle raised him. His first language was Meriam Mir. His connection to this language and the culture of his birthplace formed the foundation for everything that followed. In 1959, he moved to Townsville, Queensland, taking on various jobs. He married Bonita Neehow, and they had ten children. Gifted in music and dance in the Meriam tradition, he also enjoyed drawing and painting. Though he spent most of his life on the mainland, he remained deeply connected to Mer and Meriam culture. Already recognised as an Aboriginal leader, in 1972, he wanted to visit his father, who was ill with tuberculosis, on Mer Island. At the time, a permit issued by Queensland authorities was needed to

visit Mer island. Authorities denied his permit request, claiming he hadn't lived there for a significant time – a decision motivated by politics. Shortly after, his father died. Profoundly affected by this injustice, Mabo resolved to fight more strongly for equality and recognition. This began a ten-year battle for justice. On May 20, 1982, Mabo and four fellow islanders from Mer Island filed a claim with the High Court of Australia for ownership of their land, known as the "Mabo case." On January 21, 1992, almost ten years after the process began, Eddie Koiki Mabo died of cancer. Shortly thereafter, on June 3, 1992, the High Court of Australia ruled in favour of Mabo and his fellow plaintiffs. This judgement recognised the rights of Aboriginal peoples for the first time, confirming that Australia was not empty land before the British arrival. The name Edward Koiki Mabo became synonymous with the fight for equality, though he did not live to see the honours awarded to him posthumously. He and his colleagues received the Human Rights Medal, Mabo was named Australian of the Year, and the James Cook University library, which also houses his bust, bears his name. A documentary film was made about his life. The important thing, however, is that whenever someone says "Mabo," it is a synonym for justice, equality, and persistence in the battle for truth and justice.

Drought and heat stress are major limiting factors for sunflower production in Australia. In addition to these abiotic stresses, fungal diseases can also significantly reduce yields. Rust is a particularly important disease in Australia.

Sunflower rust (***Puccinia helianthi***) caused significant damage to sunflower in the mid-20th century, practically worldwide. While the introduction of resistant hybrids and the application of fungicides reduced the damage, it continues to appear regularly each year. In recent years, particularly in eastern Russia and Ukraine, this disease has become increasingly relevant. The pathogen rapidly changes physiological races and, under favourable conditions, spreads quickly. The appearance of rusty pustules, first on the lower leaves, is the most evident symptom. Over time, it affects the rest of the foliage, and towards the end of the cultivation season, it turns black from teliospores. Rust, if the infection is strong enough and comes early enough, can significantly reduce sunflower yield, as well as the oil content of the grain.

In addition to other diseases that can occur in Australia, my first knowledge of sunflower in Australia is connected with rust, thanks to significant research on the collection of races of this pathogen, and likely the greatest diversity of sunflower rust pathotypes in the world. Wild relatives of sunflower in Australia have been known for over ninety years, primarily populations of ***Helianthus annuus*** and ***Helianthus debilis***.

Interesting fact: Stories from Australia aren't just stories about sunflower diseases and cultivation technology; one such story was published in 2015. I read an article in the Sydney Morning Herald magazine by Paul McGoaf and Kate Gerati. I'm sure you'll like it, as it only confirms my belief that if we truly believe in something, it will come true.

The Ukrainian-Russian conflict escalated significantly on July 17, 2014, when a missile over Ukraine hit a Boeing 777 plane from Malaysia, and all 298 passengers and crew members perished. Among them were 38 passengers from Australia. Paul and Kate decided to go personally to the crash site, representing family members of the deceased who couldn't travel there.

I lived for five years not far from where the plane crashed, and I remember being horrified by the images of scattered aircraft parts after the tragedy. I believe eighty children were among those who died on the plane.

It's believed the missile exploded about 4 meters from the cockpit. Shrapnel with great destructive power directly killed the three crew members in the cockpit, then caused the plane to disintegrate – first the cabin, then parts of the wings, and finally the rear. After about a minute, the fuselage hit the ground. It seems like the end of the story, but it isn't. This is actually the beginning of another.

Parts of the plane crashed into a sunflower field. We all know Ukraine is the world's largest exporter of sunflower oil. When Paul and Kate arrived at the crash site, they initially thought they would bring some Ukrainian soil to Australia as a memento of their compatriots. Seeing the sunflower field with scattered aircraft parts, they decided to take sunflower seeds from the field where the plane

had crashed. As time went on, their idea became more real. Paul said, "This is something for our government." Bringing sunflower seeds into Australia is a complicated process. Australia has one of the strictest quarantine procedures for importing seeds. Paul and Kate contacted the Australian government in Canberra, but received no response. They decided to take matters into their own hands. They went to the village of Rasipne, where a piece of the cabin was found, and then broke off the heads of the sunflowers, putting them in suitcases. Paul, in his room in Kyiv, threshed the sunflower heads until 2 a.m. and finally obtained 1.5 kg of seeds. Paul then returned to his home in the US, and Kate traveled to Australia.

For several months, Paul thought about what to do with the seeds. He believed the Christmas holidays were the best time to give the "seeds of remembrance" to his family. Paul then wrote an article and invited anyone who wanted to receive the seeds to contact him. Meanwhile, Paul was approached by Nicole Hinder from the Australian quarantine department, hoping to help him bring the seeds into Australia. Nicole suggested that the seeds be sent to Australia through the Washington Embassy. The cautious Paul listened to Nicole, but still kept 500g of seeds because, as we say in Serbian, "Za ne daj bože1" The plan was to plant the seeds in Australia, breed it

[1] Translator's note: Common expression of abundance of caution. Literally "For God forbid," meaning "in case of disaster, but hopefully never needed"

in quarantine conditions, right up to harvest time, and then, if all is well, send the new seed to the friends and families of the fallen. When Nicole started to communicate with Paul, she told him there was an issue with the germination potential of the seeds. Paul then placed several seeds to germinate at his home in his window box. Later, this will turn out to have been crucial. When the first sprouts showed up, he called them "Proof of life." The Australian government expressed great skepticism that Paul's wish would come true, but despite this, he still believed. After his article was published, the friends and family of the deceased strongly supported Paul's ideas. Many wanted the remembrance seeds for various unexpected reasons, even remembrance of the unrequited love of someone who died in the crash. Paul was very touched by these highly emotional letters.

The results of attempts to obtain seedlings from the Australian quarantine service were discouraging until Paul showed them the result of his sprouting on his windowsill. Inspired by Paul's seedlings, experts in quarantine applied a different sprouting technology.

First, they held the seeds for 20 minutes at a temperature of 50°C, then placed them for germination. Germination was around 5%, but it was enough to obtain some seedlings, which they then transplanted into 20 pots and placed in different parts of the greenhouse to reduce the risk of unsuccessful cultivation. On January 28th, Paul received a letter from Nicole, where she shifted from pessimism to cautious

optimism. If one plant produces 1000 new seeds, then, according to a simple calculation, 20 plants will produce 20,000 seeds. They were all eagerly awaiting to see what would happen to these 20 plants by the end of the vegetation period, and whether the quarantine inspection would yield a positive result. Paul and Nicole were in daily contact, becoming true friends in the process. They were terrified that some quarantine disease would appear in the meantime – that would be the end of the project. As the plants approached flowering, the question arose of who would pollinate them, given the absence of bees. They solved this obstacle by hand-pollinating with a brush and transferring pollen from plant to plant. On May 8th, Paul received information that the sunflower heads were threshed, and the seeds were placed to dry. On May 20th, the quarantine inspection of the seeds began. Everything went well. They didn't even charge Paul and Kate for the entire procedure, as a sign of full support for this humanitarian project. They divided the seeds into 200 smaller packages, ready to send to the families and friends of the victims. In the meantime, Paul received a large number of letters from the families of victims around the world, who had imported the seeds from the 500g that Paul had saved and sent to various addresses in their country, because the procedure for importing seeds into their country was not as strict as in Australia. The sunflowers obtained from the "seeds of remembrance" were called "new life." They treated them as living beings, as a memory of their dear people lost in that senseless accident.

Paul and Kate sent the new seeds to the families before July 17th, before the anniversary of the tragedy. Paul wrote that the entire journey he and Kate had gone through would have been in vain if it hadn't been for Nicole's help.

The most important message of this story is to sincerely believe in what you want to do; there will always be a friend who will help you achieve it.

The sunflower was introduced to Australia in the 19th century and was mainly used as poultry feed. However, it was only just before the beginning of the Second World War that it began to be used as a source of oil, nearly a century after the start of mass cultivation in Russia. It reached its maximum during the eighties of the last century, when it was being cultivated on nearly 400,000 hectares. Today, this has fallen dramatically to only a few thousand hectares. The mass closures of sunflower oil factories and drought were the main causes of the vast reduction in sunflower production. These conditions made it impossible for sunflower to successfully compete with sorghum and cotton. Of the five million tons of oil-bearing seeds produced in Australia, 85% are rapeseed, and sunflower is less than 1%. Currently, Australia grows largely high-oleic hybrids. Today, the Australian Sunflower Association is trying to restore the image of the sunflower and is increasingly successfully promoting it, especially for direct consumption in food.

These days, the sunflower is significantly more popular in agro-tourism in Australia than in cultivation for oil production. Under the motto "pick your own," farmers invite people to come

to their sunflower fields, pick a bouquet, and take pictures. It seems that this is more profitable for them than cultivating it for oil production.

It is difficult for me to believe that the sunflower will ever regain the popularity it had in the 1980s in Australia, but I still believe that a miracle can happen.

Interesting fact: Three stories from Australia have captured my attention because they talk about what the sunflower actually is. It's all due to one phenomenon – Facebook. It all started when farmers who cultivate rapeseed complained that visitors were disrupting their usual life on the farm. It was even worse when they came to the sunflower field. But what looks like a problem at first can turn into an advantage. Instead of driving visitors off their fields, some farmers decided to make the best of it and increase their profits substantially.

A producer from Queensland decided to significantly reduce their sunflower fields to increase the diversity of types, as photography enthusiasts enjoyed photographing themselves with low-growing, tall, branched plants, or those with large heads. The entrance fee to the field is $10 Australian dollars for adults, $5 for teenagers, and free for children. This approach also required a change in technology, particularly in the use of pesticides, with a greater focus on biological preparations.

Due to a lack of water, one traditional alfalfa producer from a farm near Brisbane switched to cultivating sunflower, primarily for tourism purposes. They planted about 8 hectares of sunflower, organized a sunflower festival, created a sunflower labyrinth for children, stalls for

sales, and many other activities. The ticket price is 22 Australian dollars, and the number of visitors is limited to 15,000 during the festival. The problem is that, due to weather conditions, it is difficult to predict when the sunflower will bloom.

A farmer from Victoria started cultivating sunflower quite by accident. While exclusively raising dairy cows, the farmer's wife wanted to start something that resonated more with her gentle nature than endless cow milking. They planted sunflower. Initially, they planned to supply florists with cut sunflower, but it proved difficult for technical reasons. So, why not invite people to pick sunflower themselves in the field? Believe it or not, up to a thousand people came every weekend. To control visits the following year, they planted sunflower within a fenced area.

I must admit that Australia is not a significant sunflower producer, but they certainly don't lack ideas and a great love for this plant species.

Africa

In most countries on the African continent, sunflower is a relatively new crop, with the exception of the long-established tradition of cultivation in the Republic of South Africa, where it is cultivated, you could say, on significant and stable areas. When discussing sunflower production, Russia, Ukraine, Argentina, Romania, etc., are most often mentioned, but rarely, for example, Tanzania. Formed by the unification of Tanganyika and Zanzibar, Tanzania liberated itself from British colonialism in 1961. It is mostly mountainous in the northeast, where Kilimanjaro, the highest peak in Africa, is located. In the northwest is Lake Victoria, the largest lake in Africa. The population is nearly 60 million, and most are engaged in agriculture. There are 10 ethnic groups living in Tanzania.

In Tanzania, a million farmers cultivate sunflower on about a million hectares. The yield is meager, around 500 kg/ha. Such a large number of small producers is accompanied by a large number of small companies for cold-pressing oil. For example, consider the Singida region, the second-largest sunflower-producing region in Tanzania, which has about 170 sunflower processing plants, of which only two are larger industrial plants. With such low productivity, sunflower oil production is insufficient for Tanzania, so most of the oil is imported, and it is mainly palm oil.

Interesting fact: As we mentioned earlier, Kilimanjaro is the highest peak in Africa. This volcanic mountain is over 4 million years old. In the literature, it is often stated that a very unusual plant species, the Kilimanjaro sunflower, grows on Kilimanjaro. This is the giant groundsel (Dendrosenecio kilimanjari). The only connection to the sunflower is that it belongs to the same family: Asteraceae. It is charmingly beautiful, so it is often called the Kilimanjaro sunflower. This plant plays a very important role in the ecology of Kilimanjaro. It is a habitat for a large number of animals. The leaves are a source of food for herbivores, and it also has a significant role in preventing soil erosion. It belongs to the group of endangered species in that area. From this plant, the alkaloid cinchonidine has been successfully isolated, which is characterized by a pronounced anti-malarial effect. One of the most beautiful sights I have seen is the giant groundsel cultivated at the foot of Mount Kilimanjaro. The view is unforgettable for everyone, and especially inspiring for photographers.

The government of Tanzania is developing a plan to increase sunflower production and reduce dependence on imports. They consider sunflower an ideal crop, as they are adapted to most cultivation regions. Low productivity, however, is due to poor seed quality, as most producers use seeds from their own harvest for sowing the following year. Due to outdated technology and poor seeds, crops are frequently thinned. The high cost of fertilizers and pesticides limits their application in production. Considering the large number of small producers, knowledge transfer is slow and insufficient. The financial sector is hesitant to take risks with small producers, preferring to cooperate with larg-

er processors. Small producers often do not have their own bank accounts, nor any kind of crop insurance. In any case, Tanzania has a long way to go to double its production, as planned. It is up to us to acknowledge this and provide support.

Interesting fact: Anyone who enjoys the music of the legendary rock group Queen has surely watched the film "Bohemian Rhapsody," probably more than once. I am from the generation that loved and bought a great many long-play vinyl records, and eagerly awaited the release of this album, enjoying every song on it. Rami Malek's acting in the film is incredible, and he deservedly received an Oscar. He portrayed one of the greatest vocalists in rock music history, Freddie Mercury. And, curiously, Freddie has strong ties to Tanzania. He was born in the Tanzanian archipelago of Zanzibar to a Persian family who were followers of Zoroastrianism, a religion based on the teachings of the ancient Persian philosopher and prophet Zoroaster, whose core belief is dualism. The essence of dualism is the struggle between truth and falsehood, good and evil, light and darkness. Freddie was born on September 5, 1946, in a state hospital in Zanzibar. His father, Bomi Bulsara, was from the state of Gujarat in India and worked in the High Court in Zanzibar. He married Jer, also from India, and they lived together in Zanzibar. Their son was named Farok, and their daughter, Kashmir. This means Freddie Mercury's birth name was Farok Bulsara. Although Freddie rarely spoke about his life in Zanzibar, Zanzibar itself often speaks of Freddie. Fans of

Queen frequently travel to Zanzibar to visit his house, school, and the court where his father worked. There is also a restaurant named after Freddie Mercury. Freddie's family lived in the old part of Zanzibar City, called Stone Town. He first attended a missionary school, but when he turned eight, his parents sent him to study in India. He attended an English school in Bombay. Thanks to his grandfather, grandmother, and uncle, he also discovered his love for music and formed his first band – Hectics. This was a school band, and the members, aside from Freddie himself, were Derrick Branche, later known for his roles in movies, Bruce Murray, who later led the music centre in Bradford, Victory Rana, who went on to be a general in the Nepalese Army, and Farang Irani, who later ran the family restaurant. Freddie returned to Zanzibar in 1963, the same year Zanzibar declared independence from Great Britain. That year, Freddie also finished school, and the following year, the revolution occurred, prompting the Bulsara family to leave Zanzibar. Zanzibar united with Tanganyika, and then the United Republic of Tanzania was formed, with Zanzibar retaining autonomy. The Bulsara family moved to England, and since 1970, music has never been the same. Queen was born. Farok became Freddie. During the celebration of Freddie Mercury Day in Montreux, Switzerland, in 2019, fans wove him a wreath of blooming sunflower heads and hung it on his bust. The photo circulated around the world.

Stories about Tanzania and sunflower are enchanting and intertwined with their culture. One such story comes from Aida Isinika and was published in the journal ***Future Agriculture***, which is an alliance of research organizations based in Africa, whose goal is to provide timely, high-quality, and independent information and advice to improve agriculture in Africa. In the mid-1990s, the Singida region of Tanzania became a center for the spread of sunflower, primarily for oil production.

As a crop, sunflower was introduced to their fields about ten years earlier as a secondary crop. Women in these families traditionally provide income for food and hygiene supplies, while men are responsible for larger family projects such as building a house, trading animals, and developing the farm. As long as sunflower remained a secondary crop, women were responsible for its cultivation. With the introduction of higher-quality seeds and an increase in the number of cold presses, the importance of sunflower grew. It transitioned from home oil pressing, done by women, to semi-industrial processing. Electrification led to larger oil factories. Sunflower production increased, and that's when men became involved. Women felt they were losing control over their favored crop and decided to fight for it. In the village of Isane, seven women's groups were founded. They developed a strategy based on the tradition of the tribes in the Singida region. This custom allowed women to request a piece of land from their husbands' farms to meet household needs. This land allocated to women is called "Nsoza" in the local language. The women of the village used Nsoza to continue cultivating their sunflower. Utilizing the benefits of the village community bank (VICOBA), they agreed to repay cash loans in sunflower seeds. At the end of each cultivation season, the women's group decides what to purchase with the earnings from sunflower production, usually items that would improve the standard of living for each member. Initially,

they gave the money to their husbands to buy clothes, but the husbands often returned home without new clothes or the money. The women decided to no longer give them money directly, but to buy household necessities themselves, such as clothes, kitchen utensils, beds, and mattresses. This collective approach, the possibility of loans, and earnings from sunflower production significantly improved the families' standard of living.

The climate, often harsh and unpredictable, especially with drought, is a major challenge for Tanzanian farmers in ensuring food and income. Cultivating drought-tolerant sunflower varieties and hybrids can significantly reduce production risk. One way to mitigate the effects of drought is to cultivate early-maturing sunflower types. Donating early sunflower genotypes and training farmers on proper cultivation techniques are among the best ways to support farmers in Tanzania. Increased income from more successful sunflower production significantly improves families' quality of life. Demand for sunflower in Tanzania is growing daily, so it's necessary for farmers to receive better training in production technology and have access to an appropriate assortment of seeds.

Interesting fact: What do Tanzanian women traditionally do when harvesting sunflower seeds? Usually, sunflower heads are cut at full maturity and left for a few more days to dry completely. Then, the heads are manually "threshed," and the seeds are winnowed with the help of the wind, just as our grandmothers winnowed beans. The seeds are then crushed in a wooden or ceramic mortar. The resulting mass is sieved through a sieve to remove the husk, producing sunflower flour, called "husee wa kuhata mmboga" in the local Kihehe language. This flour is then poured

into boiling water, with onion and tomato added, creating a sauce. More vegetables are then added, and it's left to cook until thickened. Wonderful, isn't it?

Must try: There are many dishes in Tanzanian cuisine, but one has captured my attention due to its ease of preparation and use of sunflower oil (not palm oil). The dish is called "Kuku Nazi" or "chicken coconut" in Swahili, the indigenous language of East Africa, and it's truly delicious for those who enjoy curry dishes. An African proverb says: "If you know his father and grandfather, don't worry about his son." This applies to the head chef of LSG Sky Zenaic, Mvungi, in Dar es Salaam, whose grandfather was also a skilled cook.

For this recipe you need: 100g sunflower oil, 100g finely grated onion, 2 tablespoons chopped ginger, 2 teaspoons curry powder, 2 teaspoons ground cumin, 1 teaspoon ground turmeric, 1 teaspoon ground cardamom, 500g chicken breast (cut into approximately 2.5cm cubes), 100g diced tomatoes (approximately 1cm cubes), 300ml coconut milk, 240ml cream, 300g grated potatoes, salt and pepper to taste, coriander leaves and lemon for garnish.

Preparation: Fry the onion in oil until browned, add ginger, curry powder, cumin, and cardamom (chili pepper if desired), and fry for about eight minutes, stirring frequently. Add turmeric (and garlic

if desired) and salt, and fry for a few more minutes, stirring well. Add chicken, tomatoes, potatoes, coconut milk, and cream, and simmer in a covered pot over low heat for an hour, or until the chicken is tender. Season with salt and pepper to taste. Serve with basmati rice, garnished with fresh chopped coriander leaves and lemon. Enjoy!

Uganda is also a country where sunflower is cultivated on significant areas, similar to Tanzania, on a large number of small farms. Uganda lacks sufficient sunflower to meet its needs, which are twice as high as current production. The shortfall is filled by importing palm oil. Production is mainly located in northern Uganda. Poor quality seed material, low use of mineral fertilizers and pesticides, and the general state of the market significantly hinder the growth of sunflower production. Uganda has several projects to accelerate this growth, and one of the most important is farmer education, organizing farmers into cooperatives that will work closely with the processing industry. If the processing industry knows it has stable producers and partners, it will also be more willing to invest in production. Sunflower is a profitable crop for farmers because production is lower than demand. An illustrative example is a farmer named Kamau, who in 2021, harvested 5 tons of seeds from about 3 hectares and renovated his dilapidated house from the proceeds of the sale. Today, sunflower is cultivated on about 300,000 hectares in Uganda.

Interesting fact: The film "Queen of Katwe," filmed in 2016, is a beautiful but also a complex story that I also connect with the story of sunflower in Uganda. Phiona Mutesi's story is like that of a sunflower who rose above other plants, turning towards the Sun and putting all others in the shade with proud beauty, but also with a will to

survive. She was born in a very poor suburb of Kampala in 1996. Her father died of AIDS, her sister also died from unexplained reasons, and so Phiona had to leave school when she was only nine. She had to work selling corn on the market, so that she and her mother could feed the family. In a way that only life in its infinite variety can arrange, it is by following her younger brother that she discovers chess as part of the activities provided by the Outreach Institute in Uganda. Thanks to Robert Katende, a chess coach, engineer, and philanthropist, the little Phiona, nearly illiterate at the time, started to play chess. The rest is a story you will read in a book or see on film. In 2010, when she learned she was going to the 39th Women's Olympiad in Russia, her only question before the trip was, "Is it cold there?" Journalist Tim Crothers wrote a wonderful report about her in ESPN magazine. Chess-playing turned Phiona's life entirely around. She won several Ugandan championships and participated four times in the Women's Chess Olympiad. In 2016, Tim Crothers published the book "Queen of Katwe," for which Garry Kasparov wrote a commentary. Teenage Fiona and Garry played an exhibition match at the World Summit of Women in New York City, USA, in 2013. In 2017, Fiona received a scholarship to Northwest University in the USA, finished college, and decided to return to Uganda, helping children living in the slums of Uganda. It's a wonderful story about chess, poverty, and love for one's country. I sincerely recommend watching the film "Queen of Katwe."

In Kenya, sunflower is becoming increasingly attractive to farmers. Farmers can obtain up to 1.5 tons of sunflower seeds from one hectare. On average, 4 kg of seeds yield 1 liter of oil. In financial terms, this is equivalent to approximately 600 EUR per hectare. The remaining cake after oil extraction is utilized as animal feed. Sunflower cultivation in Kenya extends beyond Bungoma County to include Kakamega, Meru, Homa Bay, Kajiado County, and the coastal regions.

Interesting fact: Have you ever considered breeding sunflower for elephant tolerance? Sunflower is susceptible to numerous diseases and pests, and introducing resistance genes is a primary goal in sunflower breeding. It's a constant battle between plant breeding and pathogens. Each time a new source of resistance is introduced, we know that within a few years – especially with vertical resistance – the pathogen will mutate, adapt to the host, and require us to seek new resistance sources. The same applies to herbicide resistance; eventually, every herbicide resistance is compromised by the emergence of resistant weeds. Throughout my breeding and scientific career, I've participated in or led projects to discover or introduce resistance to various pathogens. However, the most significant challenges often come from wild animals and insects, which can cause considerable damage in some years. While repellents have limited effectiveness, I've never considered, nor undertaken a project on, resistance to elephants.

Kenya is replete with national parks. During droughts, both the park and farmers' fields undergo a dramatic transformation. Then you see tears in the eyes of farmers and their families, not only from the drought but also from the arrival of elephants. Seeking food and water, they descend into villages, causing extensive damage. This damage can be so severe that many families require food aid from the Kenyan government to survive. One way to mitigate this is to cultivate more drought-tolerant crops, but also those tolerant to elephants. Observations have shown that elephants avoid farms where sunflower is cultivated.

Sunflower yields seeds and encourages beekeeping; farmers place hives in sunflower fields and produce sunflower honey. The cake remaining after oil extraction significantly improves the nutrition of poultry on farms, a practice becoming increasingly common among farmers near national parks. The presence of hives has a positive effect, deterring elephants from the bees and sunflower fields. Elephants bypass sunflower fields in search of maize on other farms, but they do not touch the sunflowers themselves. I suspect farmers sow different genotypes and at varying times, prolonging sunflower flowering and thus enhancing the effectiveness of this practice.

The limiting factors for them are a lack of seeds for sowing and irrigation systems. These would significantly improve germination, increase yields, and enhance oil content, as drought reduces both yield

and oil content. Better crop condition also provides farmers with better pasture for bees and more honey. Thus, sunflower helps resolve the long-standing conflict between people and elephants in the best way, enabling farmers to obtain seeds, oil, and honey.

Although I have never performed sunflower breeding specifically for elephant tolerance, and knowing that elephants avoid bees, genotypes that are more attractive to bees would likely be even more effective in keeping them away from sunflower fields. By breeding sunflower for increased nectar content, especially under unfavorable climatic conditions like drought, we may indirectly influence elephants as well. And as I have repeatedly said: "If you don't know the answer, set up an experiment." So, dear Kenyans, here's an idea for experimentation in the coming years. If our farmers switch to cultivating only sunflower, perhaps our Jumbo friends will prioritize: "It's better to be a little stung than to die of hunger." Perhaps, in the meantime, our Jumbo friends will become tolerant to bees, rendering all our efforts in vain. Time will tell. In any case, the Kenyan government has a developed plan to increase sunflower production and reduce dependence on imports in the next few years, providing the necessary assistance to farmers. The job of breeders then is to respond to the needs of Kenyan farmers, including, I suppose, elephant tolerance.

Sunflower cultivation in the Republic of South Africa (RSA) has been successfully practised for decades, commonly across around half a million hectares, yielding approximately 1.4 t/ha.

Acreage fluctuates depending on profitability, with maize being the primary competitor. During my time in this wealthy African nation – rich in gold and diamonds – I became acquainted with both the cultivation practices and the challenges of cultivating sunflower. It's a densely populated country with over 40 million inhabitants, where the majority (75%) are indigenous. It has eleven, fully co-equal official languages, and uniquely, it has three capitals: Cape Town (legislative), Pretoria (executive), and Bloemfontein (judicial). The largest city, however, is Johannesburg. Historically, the RSA was a focal point of conflict between two major colonial powers: the Netherlands and Great Britain. The discovery of diamonds and gold in the second half of the 19th century intensified this conflict, leading to the First and Second Boer Wars, ultimately won by the British (1899-1902). The majority of the indigenous population was subjugated by the white minority. One word has dominated global consciousness for decades: apartheid. Is there anyone on Earth unfamiliar with this term, originating in the RSA? When the National Party won the 1948 elections, a terrible system of racial segregation known as apartheid began. This division categorized people into four groups: whites, blacks, coloureds, and Asians. Schools and all public institutions were segregated, interracial marriages were prohibited, blacks were restricted from entering white areas without special passes, and 'bantustans' – territories within the RSA allocated to the black indigenous population by the white authorities – were created. Apartheid provoked international reaction and sanctions against the RSA, but persisted for over 40 years.

Interesting fact: Nelson Mandela defined the twentieth century. From his youth, he fought for the rights of the black majority, studying and practising law. His activism led to a life sentence, but

he became a symbol of the struggle for black rights in the RSA. He spent 27 years in prison, being released in 1990, marking the beginning of the end of apartheid, which was officially abolished in 1991 with the repeal of the racial laws and the freeing of most of the political prisoners. The first free election was held in 1994, and Mandela was elected president. Mandela received the Nobel Peace Prize for abolishing apartheid and his contribution to equality in the RSA. He married three times, had six children, 17 grandchildren, and numerous great-grandchildren, marrying for the third and final time on his 80th birthday. His death at age 95 prompted an article I read about Cliff Rozen, an urban farmer from Johannesburg. Upon hearing of Mandela's death, Cliff went to his garden and picked a sunflower almost 2m tall. He explained, "I chose this flower because it is above all of us, and I feel as if today, the whole world got a little smaller" reflecting the profound impact Mandela had on freedom-loving people worldwide, and especially on his country and its people.

While travelling through sunflower fields in the RSA, I also learned about the challenges of cultivation, particularly white rust (***Albugo tragopogonis***), which, while not a significant problem in Europe (though its frequency has increased in recent years), can be substantial. Typical symptoms appear as small yellowish spots on the upper leaf surface. On the lower surface, white pustules containing sporangia form, representing the asexual stage of this fungal disease. When the tissue ruptures, the sporangia are dispersed by wind as a whitish powder. Earlier infection leads to greater damage.

Albugo is a polyphagous pathogen attacking a wide range of cultivated plant species, particularly vegetables, but also weeds. Some researchers note the term "rust" is misleading, as it more closely resembles downy mildew. However, resistance to white rust is distinct from resistance to downy mildew. The best methods for controlling this disease involve destroying weeds, practicing crop rotation, employing chemical control measures, and selecting tolerant genotypes.

Following the sunflower's journey around the globe, we've learned how important this plant species is becoming in Africa, and that this continent will, sooner or later, become not only an importer, but also an exporter of sunflower oil. Due to its adaptability to dry and extensive cultivation conditions, the expansion of sunflower cultivation in Africa is becoming a reality.

South America

The ***Asteraceae*** family, represented on all continents except Antarctica, is often called the sunflower family. In 2010, in Patagonia, Dr. Viviana Barreda and colleagues from the Museum of National Science in Buenos Aires discovered an incredibly well-preserved fossil identified as an early relative of ***Asteraceae***, dating back almost 50 million years. This suggests the ***Asteraceae*** family may have originated in part of Gondwana (the southern supercontinent), now located in South America, after Gondwana separated, forming South America, Australia, Africa, Antarctica, and India. At that time, the region was subtropical, with an average temperature of around 19°C. ***Asteraceae*** fossils are rare, usually limited to pollen grains, but this find contains a remarkably well-preserved flower and even seeds. Previously, it was believed this family originated from a single common ancestor in the once-tropical Antarctica, migrating to Australia and South America and then branching into the ***Asteraceae*** and ***Calyceraceae*** families over 50 million years ago. In any case, this fossil provides clear evidence of the sunflower family's existence during its early stages of diversification.

Mexico has a rich history with the sunflower, which was cultivated as a crop for 2600 years before Christ. For the Aztec people, the sunflower symbolized war and was depicted on the shields of several important deities. Like with North American Indians, it was also used as an ornamental species in Mexico, and

the seeds were used as food to make a porridge-like drink called "atole," as medicine, or as a symbol. The Nahua, descendants of the Aztecs, have two names for the sunflower: ***chimalxochitl*** and ***chimalsuchitl***. In Aztec medicine, the sunflower was used to treat stings and burns. In the 16th century, Sahagún's encyclopedic Florentine Codex detailed the sunflower's symbolism among the Mexican nobility and merchants. Merchants played a vital role in the banquets held by the nobility, which consisted of four main parts: flowers, tobacco, food, and chocolate. The "shield flower" in these rituals was none other than the sunflower. The sunflower holds a special place in Nahuatl poetry, associating the flower with the sun, the god of war, and a crucial piece of military equipment – the shield. The sunflower appears as a motif alongside famous Mexican deities: Huitzilopochtli, Tlaloc, and Opochtli.

The Republic of Argentina is the second largest country in South America and the eighth largest on the planet. The name "Argentina" first appeared in the early 17th century when the territory was called the Land of Silver, derived from the Latin word ***argentum,*** meaning silver. When Spanish conquistadors shipwrecked while following the Paraná River, the natives gifted the survivors with silver objects. If Argentina is the land of silver, then in terms of sunflower, we could call it ***Terra cuprum***, because in terms of area and production, it ranks third, after Russia and Ukraine. Argentina is a country where I spent almost a year of my life and to which I have always gladly returned. Its landscape, wealth, and people have always fascinated me. It has a very developed and organized agricultural production in all areas. Who hasn't heard of the Pampas and Patagonia? And if there's anyone who hasn't tried Argentine steak and drunk excellent Argentine wine, well, it's past time that they did! It's a large country with a very diverse climate. Argentina was inhabited as early as the Paleolithic era. Paintings from the Cueva de las Manos caves in

the province of Santa Cruz represent one of the oldest pieces of evidence of indigenous culture in South America. The cave got its name from the hundreds of hand paintings on the rock walls. The age of the paintings was determined based on the age of the bone pipes used to apply the paint, which date back to around 7300 BC, although the drawings were made in multiple stages. The site is a historical national monument in Argentina and part of the UNESCO World Heritage Site. In the pre-Columbian era, the area of Argentina was sparsely populated, and the first Europeans arrived with the voyage of Amerigo Vespucci. During the colonial period, Argentina was inhabited mainly by Spanish immigrants, but also by other peoples. Buenos Aires became the capital in the 18th century. The struggle marked the beginning of the 19th century for the attainment of independence of South American states. Argentina is a federation consisting of 23 provinces and one autonomous city: Buenos Aires.

Interesting fact: My generation's childhood is difficult to compare to the childhood of today's generations. Besides school and some extracurricular activities, our boyhood life in the city of Sombor took place in the street and in the neighborhood. Every one of our gatherings was related to play, and races were always organized. From the simplest – who could run the fastest – to races with chariots, both two-wheeled and three-wheeled, bicycles, roller skates, and sleds. Traffic wasn't heavy, and we were safe on the street. In one of our neighborhood bicycle races, I won with my blue bicycle. After the race, I first heard one of the older boys say: "You were like Fangio!" That really interested me as a boy, so I wanted to learn more about Fangio. Later, I borrowed, and even

bought, books about him. Back then, as a boy, I didn't even dream that the sunflower would connect me with my racing idol, Juan Manuel Fangio. And the winning blue bike remained somewhere in Sombor, because there was no room for it in the truck we used to move to another city, due to the nature of my father's work as an officer in the Yugoslav Army.

Juan Manuel Fangio is a native Argentine, from the city of Balcarce, of Italian origin. He dominated the early days of Formula 1, winning the championship five times. He was known as "El Maestro" (The Master). This title record remained untouched for 46 years, when it was broken by Michael Schumacher. Fangio drove for Alfa Romeo, Maserati, and in the end for Ferrari, and won the Grand Prix for all three. In this, he is still unique. And this tells you what sort of driver Fangio was - and if anyone should compare you to him, be rightly proud of it. It's a compliment you might expect from older fans, while the younger fans might not remember much past Senna. In the 1950s, Formula 1 racing was very different from what we see today. Success mainly depended on the skill and ability of the driver himself. Races were less safe, and the physical and mental fitness of the driver was most important. It mattered more who was driving than what was being driven. That's why Fangio is the only one who won Grand Prix races in all the teams he drove for. One and only, both in driving and in life – Juan Manuel Fangio.

Almost 30 years after my bicycle victory, my travels around Argentina began in search of the best sunflower hybrids. In the province of Buenos Aires, about 50 km from Mar del Plata, in a typical sunflower-cultivation area, is the small town of Balcarce. I had a sunflower experiment in that area, which I visited with my wonderful friends and colleagues Federico and Ricardo, to assess the performance of the hybrids. As I entered the city, I came across a model of Fangio's car, and only then did I realize where I was. I approached the model in admiration and saw that one screw had fallen off and was on the ground. I picked it up and said to myself: "Sorry, Fangio, I've been waiting 30 years to put this screw on my blue bicycle." Juan Manuel Fangio was born in the town of Balcarce in 1911. A museum with over 50 model cars dedicated to him was opened in 1986, and the town also boasts a racing track named in his honour.

In 1957, the then-President of Cuba, Fulgencio Batista, organised the Cuban Grand Prix. Fangio won that year. The following year, Fangio set the fastest time in practice. However, immediately before the race, two kidnappers affiliated with Fidel Castro's movement abducted Fangio from the Lincoln Hotel in Havana. The race wasn't cancelled and proceeded without Fangio. Fangio listened to the race on the radio while the kidnappers attempted to convince him of the justness of their cause, though Fangio was generally apolitical. He eventually said, "If this has been done with a just purpose, then as an Argentine I accept it." The kidnappers intended to force a cancellation

of the race and portray Batista as incapable. After the race, they returned Fangio to the Argentine embassy, partially achieving their goal, as Batista failed to track down the kidnappers. Cuban revolutionaries took power in 1959, and the Grand Prix was cancelled that year.

Although he never married, beyond his exceptional driving, Fangio enjoyed a reputation as a ladies' man. From his many romances came a considerable number of descendants. There was another Juan Manuel Fangio, Juan Manuel Fangio II. He was his nephew, also a successful racing driver, but not like the unparalleled Juan Manuel Fangio "El Maestro"

According to the National Sunflower Association of Argentina and the work of Fernando D. Castan, Professor of Genetics and Plant Breeding at the Faculty of Agronomy of the National University of Mar del Plata, the historical development of sunflower in Argentina can be divided into six periods.

The first period is known as "Pre-industrial" and practically marks the introduction of the sunflower as a crop. In this twenty-year period, it was produced on very small areas, and more as decoration, or for human food, or animal feed. The most important population was the Russian Mammoth.

The second period, from 1930 to 1949, is known as the Great Expansion. From 1941 when the Ministry of Agriculture recognized the sunflower as an oilseed crop, the sunflower expanded quickly and reached an area of nearly two million hectares. The Russian Mammoth served as a starting population for the breeding of multiple adapted and more uniform Argentinian varieties of sunflower. The National Institute for Technology in Agriculture (INTA) opened in Pergamino during this period. I had the

good fortune to spend a few months not far from the institute some twenty years ago. Pergamino was, at the time, known as the unofficial capital of seed production in Argentina.

As it is so often the case, after a large period of growth comes a crisis, and so the third period from 1950 to 1959 is simply known as "The Crisis." The crisis was a combination of both economic and production crises due to the appearance of sunflower rust, a disease caused by the fungus ***Puccinia helianthi***. By the decade's end, sunflower was cultivated on approximately 500,000 hectares.

The fourth period is "Recovery" from 1960 to 1974, when breeders created varieties resistant to sunflower rust. Most of the resistant varieties were created by crossing with wild sunflower relatives: ***H. annuus***, ***H. argophyllus***, and ***H. debilis***. The first foreign company to introduce rust-resistant sunflower to the Argentine market was Northrup King. The company was founded back in 1884. In 1976, it was sold to Sandoz. Today, it is part of Syngenta, which is owned by ChemChina, and where I myself spent a full 16 years working. In this period, sunflower acreage tripled compared to the previous period.

The fifth period is called "Dissemination of Hybrids" and covers the period from 1975 to 1999. Producers increasingly cultivated sunflower thanks to the spread of hybrids. The first hybrid in Argentina appeared in 1970 and was based on genetic male sterility. The first hybrid based on cytoplasmic male sterility appeared in 1977. I would personally call this period the "Golden Age," not because the color of oil or flowers resembles gold, but because sunflower acreage reached almost 4 million hectares, alongside a significant increase in yield per hectare.

The last phase is called "The Relocation" and covers the period from 2000 to the present day, where areas have significantly

decreased and fluctuated, currently around 1.8 million hectares. What displaced the sunflower from Argentinian fields, and why? Usually, there's competition between sunflower, corn, and wheat. In this case, it was soybeans. Very high-yielding soybean varieties adapted to Argentinian conditions, low production costs, high demand for vegetable proteins, and the emergence of Roundup Ready (RR) technology, pushed the sunflower onto more marginal lands where soybeans were less adapted. In 1993, there were only about 5 million hectares of soybeans in Argentina; today, there are three times as many. Despite everything, the sunflower persists in Argentina, fighting for its place under the Argentinian sun.

Interesting fact: I would like to return to the first and second periods of sunflower development in Argentina, to the beginning of the last century. One name we must certainly not omit is that of agricultural engineer Enrique Klein. He was born at the end of the 19th century in Cologne, Germany. Although his parents were not involved in agriculture, he became interested in studying it while spending time in the countryside and helping on the farm of close relatives. Listening to lectures by Prof. Theodor Remy at the University of Bonn, as well as his then-assistant Albert Berger – two prominent figures in the history of agricultural science – he decided to study agriculture. Only five students were admitted, including Klein. After lectures by the famous German entomologist Prof. Wigodzinski, who also worked extensively in Argentina, the idea of this vast country – which he later spent most of his life in and sincerely believed would become the world's granary – first came to him. As soon as he learned that Berger would travel to Uruguay,

he didn't hesitate to apply as an assistant and travel with him. In 1912, Klein graduated as an agricultural engineer from the University of Bonn. Together with Berger, he worked for several years in Uruguay on wheat, initially on adapting European varieties. After six years of hard work, they selected the first Uruguayan varieties, better adapted to local cultivation conditions. When his contract with the Uruguayan government expired in 1919, he moved to Argentina. He managed to find a financier and settle on a farm, living in very modest conditions but completely dedicated to breeding, primarily of wheat. He was deeply committed to his work and ideas. Not only was his breeding work based on scientifically proven genetic principles, but he firmly believed that Argentina would become the granary of the world. His work on seed production is also of great importance. Spending days in his laboratory, he scientifically proved that seed quality could be the most important factor in production. He changed the habits of producers, who previously sold the best wheat and sowed the worst, reversing the practice to what it should be. The Klein Favorito variety was cultivated on 1.5 million hectares in 1921. According to official data from the 1950s, Klein varieties accounted for about 70% of total wheat production in Argentina. Klein's company was open to everyone, so it was visited by the famous Vavilov, as well as Norman Borlaug, later the Nobel Peace Prize winner in 1970. Klein was awarded multiple times, was an honorary doctor of science at the University of Bonn, and was decorated with the Order of Merit of Germany, although he spent

his entire working life in South America. I will stop here, because this is not a book about wheat but about sunflower. Engineer Klein is also remembered as a sunflower breeder. He started breeding in 1933, realizing the sunflowers' importance and potential. In 1938, he bred the first Argentinian sunflower variety called "Selección Klein," obtained by breeding from the local population. It was significantly more uniform, lower, and earlier than the original population, with an oil content of around 39%.

During years of work in Uruguay, Klein frequently visited Nueva Helvecia and the small German, Austrian, and Swiss colony there. It was there he met Amalia María Reich Scholderle, whom he married in 1920. They had ten children, four of whom studied agriculture in Buenos Aires. Virtually all of the children continued to work on developing the company. Enrique and Amalia had around 60 grandchildren. He was a profoundly religious man, devoted to his family, work, and the community in which they lived, and he raised his numerous offspring in the same way. The family company, Criadero Klein, still exists today and celebrated its 100th anniversary in 2019, a legacy to a great breeder, visionary, father, and humanitarian, Enrique Klein.

Uruguay is a country somewhat squeezed between the two largest states in South America. Even those in Serbia who haven't read much about this country were sparked to learn more by the film "Montevideo, Taste of a Dream", based on the book by Vladimir Stanković and directed by our celebrated actor and then director, Dragan Bjelogrlić. Who could have guessed that in 1930, the idea of the then-president of FIFA would grow into what the

World Cup is today? There were no qualifying rounds at that time; teams were literally invited to compete. The FIFA president had to smuggle the trophy, and a player with one arm participated in the tournament. That year, Montevideo celebrated its 100th anniversary, and the stadium was named "Centenario" in its honor. After victories over Brazil and Bolivia, the Yugoslav team (representing a country that no longer exists) reached the semi-finals. Incredible events unfolded in the semi-finals (there was no VAR technology at the time). Yugoslavia lost convincingly, and a policeman returned the ball to the field from the stands. The referee "turned a blind eye," the game continued, and Uruguay scored a goal. The Yugoslav national team consisted of players from Serbia and one from Macedonia. Croatian footballers boycotted the Yugoslav national team and did not participate in the first World Cup. The second semi-final was played between Argentina and the USA. The final was even more unusual. The main referee, Johannes Langenus from Belgium, requested guarantees that he would reach the ship that would safely return him to Europe immediately after the final. Uruguay defeated Argentina 4-2. The first half was played with a Uruguayan ball, and the second with an Argentinian ball. The scorer of the goal against Argentina in the final was also Uruguayan, Héctor Castro. Nothing unusual, you might say, but you see it was he who only had one arm. His nickname in Uruguay was "El Divino Manco" which means something like "One-armed God." Yugoslavia, meanwhile, made it to the semifinals only one more time, and that was in Chile in 1962. That was the time when football was passion and love. Serbia, which ended up in some ways the inheritor of Yugoslavia and which hosts the largest number of Yugo-nostalgics, is renowned in the world for its basketball players, volleyball players, and water polo players, and is most successful, oddly, in marksmanship. And you could write a book about Serbian football even today, though it is hard to say if it would be a tragedy or a comedy.

Despite being a small country compared to Argentina or Brazil, Uruguay is a leader in South America according to many indicators. Most likely a leader in democracy, with a low corruption rate. It is oriented towards peace, with a low risk of terrorism, excellent economic indicators, and it is one of the most socially progressive countries in South America. It is also a founding member of the UN. The sunflower has practically disappeared from the fields of Uruguay. Sunflower oil consumption is increasing yearly, and so is the import. It wasn't always like that. As in Argentina, soybeans have pushed sunflower off the fields of Uruguay.

Interesting fact: Since 2006, every year in April in the city of San Javier in Uruguay, the Sunflower Festival ("La Fiesta del Girasol") is held. Descendants of a colony of Russian settlers from the beginning of the 20th century pay tribute to the sunflower that they brought with them on their long transoceanic journey from their homeland to their new home in Uruguay. They were also the first to begin cultivating sunflower in Uruguay and were largely responsible for its spread and use as an oilseed.

In 1913, around 300 families from the Rostov region of Russia arrived in Uruguay, seeking a place to live and freely practice their religion, "New Israel," which had developed in the Russian Empire. Their spiritual leader was Vasiliy Lyubkov. He had initially intended to bring his followers to the USA, but after visiting in 1911, this plan didn't materialize. A year later, he met the Uruguayan consul, and the idea of immigrating to Uruguay likely developed then. Representatives of the Uruguayan government also visited Russia that same year, see-

king potential immigrants. In 1913, two ships brought 300 families of these believers to Uruguay. After arriving, they stayed in Montevideo for several months before being assigned the old Espalter ranch. There, they founded the San Javier colony. Some believers returned in 1920 to the USSR, establishing a colony called "New Israel," later renamed Red October during collectivization. Some families returned to Uruguay, while others relocated to different parts of the USSR. The first Russian colonists to Uruguay in 1913 brought sunflower seeds with them, tucked in their pockets. The sunflower became a tradition within the colony, a connection to their homeland. They not only grew sunflower but also requested financial assistance from the Uruguayan government to expand production. One politician of the time remarked: "These Russians have gone completely mad, asking us for money to cultivate crops and planting flowers in the fields." These Russian immigrants not only introduced the sunflower to Uruguay but also built the first oil factory in their town. Vasiliy Lyubkov, later known in Uruguay as Basilio Luvkov, sought a place where he and his followers could live and practice their customs and religion freely. Vasiliy had also spent time in prison in Russia. He and his compatriots found a home in the sun in Uruguay. However, life wasn't always easy. During the military dictatorship, which lasted from 1973 to 1984, the junta suspected them of communist sympathies. Many residents of the colony stopped speaking Russian, the cultural center "Maxim Gorky" was closed, and traditional costumes were destroyed. In 1984, Vladimir Roslik, a doctor of Russian origin, was killed. He was tortured in prison by the Urugu-

ayan military junta and accused of smuggling weapons, becoming the last victim of the dictatorship before its fall. A documentary film, "Roslik," analyzed the consequences of this event on San Javier, and the story of Vladimir's widow, Maria Kristina Zavalkin, is particularly poignant. With the fall of the dictatorship, the cultural center "Maxim Gorky" reopened. The Kalinka dance group from San Javier has won numerous awards at dance competitions throughout Uruguay. The "La Fiesta del Girasol" (Sunflower Festival) features musical performances, traditional crafts, and dishes from Russian cuisine, such as shashlik, varenyky, and pierogi. The Danzas Kalinka group is a major attraction, with the youngest descendants of the colony performing traditional Russian dances. I suspect the Russian emigrants also brought seeds from the Russian Mammoth sunflower variety, as did those who settled in Canada or the USA. Besides this, they were very well-known beekeepers.

Having read scientific papers on sunflower research in Uruguay, I was particularly interested in the widespread occurrence of gray stem disease (***Phomopsis helianthi***). I wanted to see the sunflower fields of Uruguay. My wish came true in the first decade of this century. After extensive travel around Uruguay, we encountered several smaller sunflower fields, but we didn't observe any gray stem disease. With the decline of sunflower cultivation in Uruguay and the expansion of soybean production, the incidence of this disease has likely decreased significantly. I sincerely hope that the sunflower will make a strong comeback in Uruguay, given the country's daily increase in sunflower oil consumption.

Then I was not far from San Javier, but at the time, I didn't know the significance of this place in the development of sunflower in Uruguay. Had I known, I would certainly have visited it and walked down Basilio Luvkov Street to pay homage to those who spread the sunflower as an oilseed wherever they went. Perhaps I would have met descendants, especially Miron Gajvoronsky, who first produced sunflower oil in Uruguay in the 1920s. That would have pleased me more than finding a gray leaf spot in a field.

Brazil remains my unfulfilled sunflower desire. And it likely will. With 35 million hectares of soybeans, and in the best years only 150 thousand hectares of sunflower – now around 50 thousand – it has remained marginal in sunflower production, despite being the largest country in South America and the fifth in the world. The region in Brazil, Mato Grosso, which once had the largest sunflower areas, cultivates around 10 million hectares of soybeans. Doesn't seem like a fair fight, does it? And how can one not envy soybeans, with them not even being a hybrid species? There are many reasons for this position of the sunflower, from climatic conditions and, especially, excess precipitation, to unadapted hybrids, registration of plant protection products, strong bird attacks, lack of boron, lower yields than soybeans, less profitability, etc. To overcome all this, the sunflower in Brazil needs a proper development strategy, long-term research funding, and crop promotion.

Interesting fact: To prevent this story about sunflower in Brazil from being so brief, I would go back to a period of four centuries ago, and to a collection of plant illustrations called "Libri Picturati," organized between 1660 and 1664 by one of the greatest German explorers of that time, Christian Menzel. The set includes 198 plant species, of

which 163 are domesticated in Brazil and 35 are exotic. One of the illustrations depicts the sunflower. Most publications state that the sunflower was introduced to Brazil at the end of the 19th or beginning of the 20th century by Europeans. However, these plant drawings from the beginning of the 17th century suggest that the sunflower was known in Brazil much earlier. Research indicates that the Tupí people in Brazil knew about the sunflower as early as the beginning of the 17th century or earlier. In "Libri Picturati," the plant is called Camará-guaçu, and the name most likely originates from the Tupí people. It's possible that the sunflower was brought to Brazil by Portuguese or Dutch explorers much earlier than previously thought. Even though "Libri Picturati" is almost four centuries old, it was sidelined and unexplored. Incidentally, this collection's history is highly interesting, and it was kept in Berlin all the way to the Second World War. Nobody knew where it was, precisely, until 1977 when it was discovered in Kraków, Poland, where it remains today. All the pictures from this collection have since been digitized.

North America

North America is the third-largest continent by area, and the fourth-largest by population. Amerigo Vespucci, an Italian sailor, explored South America at the end of the 14th and beginning of the 15th century, firmly believing it was not India, but a new territory. In 1507, cartographer Martin Waldseemüller created a map of the world and wrote "America" within Brazil, after the Latin name of Amerigo Vespucci: ***Americus Vespucius.*** In 1538, the Flemish cartographer Gerhard Mercator named the entire landmass of the Northern Hemisphere America on his map. Today, 23 sovereign states are part of North America, the largest in terms of area and population being the USA, Mexico, and Canada. However, there are still a large number of dependent territories in North America today, of which Puerto Rico is the largest. This dependent territory has its own self-government, but its residents are American citizens. These dependent territories in North America today are divided between the USA, France, Great Britain, the Netherlands, and Denmark. Greenland is part of the North American continent but is under the sovereignty of the Danish kingdom.

A large number of articles, scientific papers, and books from various fields have been written about the sunflower in North America, as the sunflower originates from North America. It's impossible to cover everything, so I will start with one interesting fact that most news agencies have reported.

Interesting fact: On August 10, 2023, Lee Wilson, a farmer near Pratt, Kansas, USA, celebrated his 50th wedding anniversary with his wife, Rene. Knowing Rene loves sunflowers, he surprised her by planting approximately 30 hectares (74 acres) of them. Journalists calculated this to be around 1.2 million sunflower plants. He and his son kept it a secret until their anniversary. Lee and Rene have been together since high school. Rene certainly didn't expect to celebrate her golden anniversary amongst 1.2 million sunflowers. Many readers and people from the surrounding area also flocked to this sunflower field to take pictures, as sunflowers bloom for a relatively short time. This is a wonderful idea for celebrating an anniversary, though you don't necessarily need 30 hectares of sunflower to do it.

The genus ***Helianthus*** includes 53 species of sunflower, 14 annual and 39 perennial. They are native to or accustomed to growing primarily in the USA, as well as Canada and Mexico. The high variability within wild sunflower relatives makes them valuable for various breeding programs. By collecting and maintaining sunflower populations, breeders have easier access to seeds, depending on their research goals. The largest seed bank of wild sunflower relatives is located in Ames, Iowa, in the United States of America. More recently, collection expeditions have become more demanding due to increasingly restrictive regulations, often requiring special permits to collect certain species and populations. Collections like the one in Ames not only preserve seeds but also contain extensive data about each population, including botanical identification, GPS location, population size, habitat, soil type, and the presence of diseases and pests. If a collected population is lost, it can potentially be restored using the GPS

coordinates. It's not uncommon for collectors to return to the same location after 10 or 20 years and find that a population has been irrevocably lost due to road construction, settlements, and other developments, further highlighting the importance of the practice of collecting wild strains. In the early and mid-20th century, expeditions were undertaken in Russia and the USA to find sources of resistance to sunflower moth, broomrape, and sunflower rust. However, systematic species collections began with C.B. Heiser in the USA, with a more taxonomic focus rather than the creation of a genetic bank. Much like any serious collection, the NCRPIS (North Central Regional Plant Introduction Station) in Iowa keeps some of its collection in alternate sites like Fort Collins in Colorado, and even in the world seed bank in Norway.

Interesting fact: In June 1996, Russian, Ukrainian, and American officials planted sunflower in freshly tilled soil on the former May Day military base. This base once housed, deep underground in bunkers, SS-19 intercontinental ballistic missiles with nuclear warheads. Given their range of 9,000 km (5,600 miles), it's not hard to assume where their targets lie. The SS-19 was designed to carry six warheads, each with a yield of 500 kilotons. The bomb dropped on Hiroshima had a devastating power of 15 to 20 kilotons, and we all know the consequences of that attack. The SS-19 was intended to attack large cities, but it lacked precision. By planting sunflower, these government representatives, sleeves rolled up and tools in hand, symbolized a "new beginning," a world built on mutual respect and trust. Ukraine, relinquishing its nuclear arsenal – estimated to be the third largest in the world at the time – received security guarantees from

the Russian Federation, the USA, and Great Britain, as outlined in the Budapest Memorandum. This was a diplomatic document in which the signatory countries pledged a peaceful nuclear disarmament process for the former Soviet republics of Ukraine, Belarus, and Kazakhstan.

It wasn't just sunflower seeds that were planted on that May Day in 1996. On July 1, 1996, Ukraine announced that there were no longer any nuclear warheads on its territory. I don't know how much time will pass before representatives of these countries plant sunflower together again. I would love to witness that, and to see sunflower plants like those replanted in all the countries that currently possess nuclear weapons. I don't believe that will happen anytime soon, and if it does happen in the foreseeable future, I would personally come to prepare the land and sunflower seedlings, regardless of my age, so that these plants would grow quickly, with large heads symbolizing peace, prosperity, and new life. I would name the hybrid "Love and Peace". Today, there are thousands of sunflower hybrids and varieties with different names, but I think no one has created this name for a sunflower hybrid so far. Let it be a three-way hybrid, with the USA providing one component, Russia another, and Ukraine the third – the USA as the country of origin of the sunflower, Russia as the country where sunflower is most cultivated, and Ukraine as the largest exporter of sunflower oil.

FAO estimates that 3% of the surface soil layer (0-30 cm) and 6% of the subsurface soil (30-100 cm) are saline, mainly in drier regions. One way to utilize such land is to cultivate species more tolerant to increased salt concentration, or to work on breeding tolerant genotypes. One sunflower species deserves special attention: ***Helianthus paradoxus*** (common name in the USA is "Pecos Sunflower"), a species found only in Texas and New Mexico. Since it was first identified in Pecos County, Texas, it was named after it. Since 1999, the species has been added to the list of endangered species in the USA, mainly due to urbanization and the draining of wetlands, habitats in which it lives. It can grow up to 2 m tall, with many side branches and flowers, blooming from September to October. It is an annual species, meaning it spreads exclusively by seed, but its range is very narrow compared to some other sunflower species. In 2008, according to the FWS (US Fish and Wildlife Service), only 528 hectares were designated as critical habitat for this species. Research has proven that ***H. paradoxus*** is an excellent source of salinity tolerance in laboratory and field conditions. By understanding the mechanisms of salinity tolerance, the success of transferring this resistance to cultivated sunflower is also increased. Considering that the sunflower is already adapted to drier conditions, this type of sunflower would expand its cultivation area.

One story about this Pecos sunflower caught my attention. It was published by Sawyer Hitchcock in 2018, in High Country News, and was titled "What's special about a good-for-nothing sunflower." In it, he describes a visit to a bar in New Mexico where two somewhat different men sit alone and have a conversation, mixing beer and whiskey. On one side is the author of this text, a young field assistant who works for a small non-profit nature conservation organization, and opposite him is a rancher and consultant for offshore oil exploration. The rancher asked only one

question to his conversation partner: "Now tell me what exactly does it mean for a sunflower to be endangered? I like 'em fine, but we've got plenty of sunflowers. What's so special about this one? I mean, what's it good for?" Sawyer had an entire past week flash through his mind, where he and his colleague located a species of sunflower known as the Pecos sunflower, where one of the seven populations that exist on this planet is located. The Pecos sunflower was for them both a puzzle, a species that searches for wetlands in an otherwise dry region. If there are no more swamps in that place, the Pecos sunflower simply disappears. These swamps, known as "cienegas", are a type of habitat in which ***Helianthus paradoxus*** lives, and they used to be very widespread in the southwest of the country. In the last hundred years, most of them have been drained or degraded by pumping water for irrigation or for urban use, due to grazing and erosion, and the introduction of new invasive plant species. This has led to the fact that otherwise dry land has become even drier. Sawyer was contemplating the future of all living things, given climate change and other impacts of human activity. Will Pecos sunflower, like many endangered species, survive only in collections? Sawyer ends his story with the question with which he also began it: Good-for-nothing!

There are sunflower varieties that are also very dangerous and harmful weeds. One of them is ***Helianthus ciliaris***, commonly known as "Texas blueweed," and listed as a quarantine weed in several US states. It's a perennial species that spreads rapidly via rhizomes, found from Texas to Kansas and California, as well as in Mexico. It doesn't grow very tall, reaching a maximum of 70 cm, but has a very tough root system that spreads horizontally, sending up new plants at a distance from the parent. As with johnsongrass, tilling by plowing actually ***aids*** its spread. The flower itself resembles a ***Tithonia***. Interestingly, this species is also known in Australia and New South Wales. The oldest herbarium

specimen in Australia was collected in 1935. There's no data on how it arrived in Australia. Considering that mechanical control can worsen the problem by fragmenting the rhizomes, preventative measures are most important, ultimately relying on chemical control with herbicides. As we can see, the beauty of sunflowers can be deceptive. Someone fascinated by this type of sunflower and introducing it to their garden might not suspect it could become a very dangerous weed.

Even as an annual species, wild ***Helianthus annuus*** has become problematic in several parts of Europe. It's often recognized by its height, branching, and large number of small heads with brightly colored anthocyanin-rich tubular flowers. It possesses exceptional reproductive ability and a strong pericarp. It's slowly but surely spreading across the European continent. One example is Serbia, particularly the region of Vojvodina, where populations were sporadic half a century ago but are now found throughout the territory. The areas around Pančevo and Belgrade have the largest populations of wild sunflowers I've seen in Europe. Wild sunflowers readily cross pollinates with cultivated sunflower. In the 1990s, with the introduction of ALS-resistant sunflower hybrids and their widespread adoption, controlling wild sunflower became an issue, as the resistance gene easily transfers to wild populations through interbreeding. After many years of coexistence between wild ***Helianthus annuus*** and cultivated sunflower, I believe that in Vojvodina today we can only speak of hybrid populations exhibiting many characteristics of wild ***Helianthus annuus***.

Helianthus tuberosus (Jerusalem artichoke or sunchoke) is a plant with a story important to both breeding and food technology. I became acquainted with this story from both sides, following the work of colleagues from the Faculty of Technology in Novi Sad on fermentation and ethanol production from Jerusalem artichoke almost three decades ago. Jerusalem artichoke

is versatile in that regard. For many years, overshadowed by potatoes, today this plant is experiencing a renaissance, especially in organic agriculture. If cultivated on 1 ha, and with each plant yielding 1.5 kg of tubers, you can achieve a yield of up to 80 t/ha. Its beneficial effect on human health is primarily due to its inulin content. It has a probiotic effect and plays a role in the nutrition of diabetics. This plant is so versatile that it offers something for everyone. It's exceptionally ornamental, perennial, blooms in late summer and autumn, grows rapidly, and is tall and robust. You can dry the tubers, grind them into flour, or make chips. Even the American Indians used Jerusalem artichoke when hunting. Later, it was found that it reduces appetite, helping the Indians to focus on hunting instead of feeling hungry. It has only half the caloric value of potatoes, a minimal amount of fat, and 250 g of fresh Jerusalem artichoke per day covers your cellulose needs. However, be careful at the beginning; inulin can cause bloating, so introducing this food into your diet must be gradual.

You can eat it fresh; it resembles a cabbage root, but if you peel it quickly, it changes color, so, like with potatoes, spray it with lemon juice to prevent that. It's recommended that the tubers be only washed well and not peeled, thus preserving their nutrients. Fresh tubers can be stored in the refrigerator for up to one month. There are many recipes with sunchokes, and as this book is also a small recipe book, here's a very simple one for sunchoke liqueur recommended by Die Topinambur Manufaktur, from Germany.

Recipe: Sunchoke Liqueur:

You need 250g of sunchokes,

400g of sugar,

and 700ml of vodka.

Peel the fresh sunchokes and chop them finely. Place the finely chopped sunchokes in a washed and dry 2l jar, then add the sugar and vodka, close, and leave to stand in a dark, dry room for 2-3 months. After that, filter, pour into bottles, close tightly, and leave to stand for another 2 months. Longer standing in bottles makes this drink even better. Enjoy!

Since we've had the aperitif, it's time to consider sunchokes as a main dish. This is where all your creativity comes into play. There are so many dishes with sunchokes – from soup to carpaccio, and more – that I warmly recommend the reader try everything. Don't forget to introduce sunchokes into your menu slowly.

I will only dwell on one more recipe here: sunchoke dessert. It's so simple yet so good, cheap, and quick. You can combine it with the fruit of your choice. In any case, if you've invited guests only for an afternoon gathering, and not for lunch, the liqueur and this dessert will be sufficient.

Recipe: Sunchoke and Apple Dessert:

You need 150g of sunchokes,

2 apples, half a lemon,

2dl apple juice,

150ml sweet cream,

½ tablespoon of honey,

and cinnamon.

First, grate the apples and sunchokes, mix them, and then add a little lemon juice and apple juice. Whip the sweet cream and honey, pour the whipped mixture into a bowl, add the sunchoke and apple mixture on top, and sprinkle with cinnamon. Enjoy!

There are two plant species known as Mexican Sunflower. Although they are called sunflowers, they are not members of the genus ***Helianthus,*** but instead the genus ***Tithonia***, though both are members of the wider family ***Asteraceae***. Two species are known under the common name of "Mexican sunflower:" ***Tithonia diversifolia and Tithonia rotundifolia,*** though the genus ***Tithonia*** has quite a few more species than that. They originate in Mexico, where their main habitat lies, but they can be found in all of Central America and certain areas of the United States. Today, as a decorative species, they grow practically everywhere. I find ***Tithonia rotundifolia***, with its beautiful red flowers, particularly interesting. It is annual, unlike ***T. diversifolia.*** Because of its color, the way it draws butterflies, tolerance to drought, and long blooming, it is loved by fans of flowers, even though it is not a true sunflower. It has some small use in medicine, while the less attractive ***T. diversifolia*** has a much wider field of use in traditional medicine, for the treatment of diabetes, menstrual pain, malaria, hematoma, and so on.

Showing how real life won't sit still and be predictable, despite the universal consensus that sunflower was first cultivated as a crop on the territory of what is today the United States, Mexico might have primacy after all. Based on archaeological findings, a group of scientists presented data that the sunflower was cultivated there as early as 2600 BC, i.e., more than 4000 years ago. This research refutes the claim that the sunflower was first domesticated in the eastern part of North America and then introduced to Mexico, and claims that it was known and probably cultivated in Mexico much earlier. The work published in the journal ***Science*** in 2001 by Kevin Pope and colleagues caught my attention because it shed new light on this topic, which has always interested me very much: Where does the sunflower come from? Archaeological excavations on the coast of the Tabasco Gulf in Mexico showed that the first farmers settled there around 5100 BC, when they cleared

forests, and the pollen grains of corn we know today as ***Zea mays*** also date back to around 5000 BC. This pervasive research was primarily focused on the pollen grains of corn, which showed significant variability, most likely due to accelerated selection.

Some sunflower achenes were also found, almost as if a gift to the researchers. The researchers in this paper didn't pay much attention to this fact, probably because they were so focused on corn, only later realizing its significance and publishing a very interesting paper in 2008 entitled: "Sunflower (***Helianthus annuus*** L.) as a pre-Columbian domesticated in Mexico." Mexico is, incidentally, known as a center of domestication for many plant species, such as gourds, pepper, beans, cotton, and sunflower. Sunflower was well known to the Aztecs. Therefore, the theory that sunflower was brought to the territory of Mexico by the expedition of Hernando de Soto in the 16th century may not be accurate. The sunflower seeds found in Mexico confirm that they were used for human consumption much earlier. A paper published two years earlier, in 2006, by Brise Smith doesn't deny the possibility of Mexico as a center for sunflower domestication. Still, it considers the evidence from Mexico insufficient to claim that the origin of domestication is in Mexico and not in the USA. Did the domestication process occur completely independently in two different places? It's best to read these papers yourself and draw your own conclusions. Perhaps new archaeological excavations will shed new light on the primary center of sunflower domestication. In any case, I would love to visit Tabasco.

A joke from my archives: Three archaeological teams were conducting research, each in their own country. At a depth of 200 meters, the first team found a conductor and concluded: "This archaeological specimen confirms that we had a telephone about 200 years ago." The second team, at their archaeological site, found a conductor at a depth of 300 meters and concluded:

"This archaeological specimen confirms that we had a telephone about 300 years ago." The third team dug and dug, reaching a depth of 400 m, but found nothing and concluded: "Since we found nothing, it can be concluded that we had a mobile phone 400 years ago." All three teams are still digging, each at their archaeological site. We expect news soon.

Interesting fact: Short story writer Legend Gilchrist, who lives, works, and writes in the USA, published a short story entitled "My Love is Sunflower." Unlike most others who are amazed by the sunflower blossom, this writer is fascinated by the sunflower seed as a symbol of love. When you look at the seed, it seems insignificantly small compared to the sunflower plant. This is actually something sunflower researchers have been researching, and the technical name is the harvest index. Gilchrist says that when you plant the seed, it develops into a beautiful plant, just like when you meet someone, and it grows into a beautiful love story. For this plant to grow, you must also be a gardener, caring for it, and adapting to its needs. In my somewhat free paraphrase, Gilchrist ends his short story like so: "At one point in time, the two of us were two flowers drifting alone in two separate fields. Then one day, we found ourselves planted right next to each other and we couldn't be happier because of it. It is my hope and desire that we will continue to grow closer together with each passing month, year, and decade. With a wing and a prayer this will become true for the both of us. It is with great seriousness and determination that I hope for this to be true for now and all ages because my love is a sunflower, the most beautiful sunflower of all."

Interspecies crossing of sunflower is not an easy task at all. Due to their phylogenetic distance, although they belong to the same genus, a large number of species are very difficult to cross with cultivated sunflower and obtain seeds.

Embryo culture is currently very relevant in plant, as well as human and animal medicine. In human medicine, it is part of ***in vitro*** fertilization, where developed embryos are allowed to grow on an artificial substrate. After a few days, the embryo is returned to the mother's uterus, where it continues to develop normally. Already after 3 days of formation, the embryo can be tested for potential genetic irregularities.

In plants, embryo culture is one of the oldest techniques applied in tissue culture. This technique has enabled significant progress in agriculture for many plant species. Embryos that, for various reasons, are incapable of developing and consequently abort can be developed into normal plants through culture on an artificial substrate, provided with all necessary nutrients. This technique has been applied in crosses within species, between species, and even between genera. Through crossing, we transfer important alleles from one plant to another, and in breeding, this primarily concerns traits like resistance to abiotic or biotic stress, fruit quality, or plant morphology. The most common cause of embryo abortion is an undeveloped endosperm, meaning the embryo lacks sufficient nutrients for development. The goal is to isolate such an embryo, place it on an appropriate nutrient substrate (or substrates, depending on the stage of development), allow it to develop above-ground parts and roots, and then transplant it into a suitable substrate to enable normal development and seed production. This technique not only allows successful crosses between distant species but also facilitates obtaining haploids, dihaploids, or plants with different levels of ploidy, which is crucial for fruit size and quality in some plant species. Embryo

rescue can also be used to study the stages of embryo development. ***In vitro*** embryo culture in sunflower has been widely used to reduce the vegetative period from 90 to 120 days to 60 to 70 days. This method is particularly suitable for backcrosses, where it effectively allows for obtaining one additional generation per year. Considering that time significantly impacts genetic gain, it becomes clear how important it is to shorten the period for obtaining inbred lines, and therefore, hybrids.

In tissue culture, the substrate most commonly used is the one developed by Murashige and Skoog in 1962, the same year the author of this book was born. This nutrient substrate was named MS0, reflecting its lack of sucrose. The same authors also developed the MS20 substrate, which contains 20g/l of sucrose. These two substrates are the most commonly used in tissue culture, and I believe that Murashige and Skoog are among the most cited authors in plant biotechnology.

Interesting fact: Toshio Murashige worked as a professor at the University of California, Riverside, USA. He was a doctoral student of Prof. Skoog, researching growth hormones in tobacco. While experimenting with the addition of different nutrients to the so-called White's medium, in 1962, Murashige and Skoog published a paper in the journal Physiologia Plantarum entitled: "A Revised Medium for Rapid Growth and Bioassay with Tobacco Tissue Culture." I think the MS medium is the most widely used nutrient medium in the history of tissue culture. Folke Karl Skoog, originally from Sweden, was known for his research on the discovery of cytokinin and was also an athlete who participated in the Summer Olympic Games in 1932. He died in the USA at the age of 92 but was buried in Uppsala, Sweden. He received the

National Medal of Science, an honor awarded by the President of the USA to scientists for their contributions to science in various fields, including the social and biological sciences. His most famous student was Toshio Murashige. Skoog emigrated to the USA in 1925. At the Summer Olympic Games in 1932, in the 1500m race, he represented his country, Sweden. He missed a place in the final by only 0.8 seconds in his group, and had he competed in one of the other two groups, he would have taken second place by time and entered the final. And anything could have happened in the final. During his studies, he won numerous first places in races. He was not only an athlete but also an exceptional cross-country skier. During his outstanding scientific career, he published more than 170 scientific papers. Over 60 students graduated under his supervision, and more than 40 postdocs worked in his laboratory. His laboratory was an international center for scientific work.

Speaking of mutations, let's turn to a truly fascinating story in the USA, the story of high-oleic and mid-oleic sunflower. There are so many interesting stories about sunflower in the USA, where it is currently cultivated on a relatively small area considering the country's size. Now, back to oleic sunflower, it is another place where the paths of the USSR and USA cross.

Karm Ivanovich Soldatov was born in 1925 in Sumy, on the territory of present-day Ukraine. After returning from World War II in 1946, he devoted himself to study, successfully completing the faculties of agriculture and a master's degree while simultaneously working with corn at the Voronezh Research Station. He received his doctorate in 1963 on a topic related to corn breeding. He moved to work at the All-Russian Research Institute for Oil Crops the following

year. He soon began research into using chemical mutagenesis to modify the fatty acid composition of sunflower. Soldatov created a unique variety called Pervenec, which had an oleic acid content of over 75%, compared to linoleic-type sunflower where the oleic acid content is up to 30%. The Pervenec variety quickly appeared in fields across Russia, and the oil obtained from this variety was marketed as a substitute for much more expensive olive oil under the name "Kuban Salad Oil," at a price of one ruble and three kopecks. Soldatov led the mutagenesis program until his retirement in 1987. As you will see, all of this is very much connected to America.

Interesting fact: The American Sunflower Association (NSA) awarded Dr. Gerhard "Geri" Flick a gold medal in 2014 for his lifelong work on sunflower breeding. After completing his doctoral studies at UC Davis, he soon began his sunflower career at a USDA program in Fargo, North Dakota. He participated in the creation of the first American sunflower hybrid "894," resulting from the crossing of a maternal line from the USDA program in Texas, under the guidance of Murray Kinman, and a paternal line RHA 274 from the program in Fargo. Hybrid 894 was the leading hybrid for almost ten years in the USA, and it was also cultivated in Europe and Argentina. Sunflower acreage in the USA grew year after year, and Geri Flick saw that the biggest opportunity was in the private sector. In 1977, he co-founded SIGCO Research. Under the leadership of Flick, this company created the first high oleic hybrid, and the high oleic hybrids of this company were very popular, especially when the oil industry paid a premium of up to 40% for this type of sunflower.

As stated in the NSA article, Flick, thanks to his acquaintance with colleagues from the former Yugoslavia, was the first in the USA to obtain seeds of the Pervenec sunflower variety, though as the text of US Patent #4,743,402 claims, this variety was available to producers in the US from 1980 onwards (I confess, I do not know what the colleagues from Yugoslavia got in return——we can only guess). The patent claims that the Pervenec variety is heterogeneous, both in terms of oleic acid and in terms of other characteristics. So the patent innovation was presented as the creation of a sunflower hybrid with a stable oleic acid content, with a high seed yield and an easily recognizable husk color. The patent also states that the advantage of this innovation is the method of creating high oleic inbred lines, and that by creating high oleic hybrids, the sustainability of the oil is extended. Furthermore, the specificity of this innovation is that the hybrid is based on cytoplasmic male sterility. After that, there is a very "academic" part of the text, which can be found in every monograph on sunflower. Reading this patent, I always wondered: what is genuinely new here? My answer was always the same: almost nothing. The high oleic mutation and the Pervenec variety are the work of Soldatov and his team in the USSR; the source of CMS is the work of Leclercq in France, and the rest is routine breeding work, such as creating self-pollinating lines and translating them into CMS form. The patent was approved, making it difficult for other companies to develop

high oleic sunflower. Unlike Soldatov and Leclercq, who allowed the whole world to use and improve sunflower breeding based on their discoveries, this patent is an example of the opposite. But the story doesn't end here. In 1995, members of the American Sunflower Association (NSA) agreed to present a new type of sunflower, called mid-oleic sunflower. This initiative was supported by both producers and the industry. The first hybrids were tested as early as 1996, and the first products appeared on the market in 1998 under the NuSun® brand, created by NSA. Within a few years, 90% of the acreage in the US planted with oilseed sunflower was NuSun,® with the remaining 10% belonging to linoleic or high-oleic types. Thus, with industry support, patent number 4,743,402 was effectively circumvented, enabling all breeding companies in the US to compete fairly in the market. After the patent expired, high-oleic sunflower quickly returned to the fields in the US. SIGCO Research was sold in 1982 to Lubrizol Corporation. In 1992, Geri Fick, along with two colleagues, founded the company "Seeds 2000," and in 2011, "Seeds 2000" was sold to the Australian company NuFarm for $55.2 million.

Native Americans used sunflower for thousands of years. They mixed sunflower flour with water, vegetables, and spices to make a kind of bread, while some tribes also pressed oil from it. They ate the seeds directly, rubbed oil on their bodies and hair, and made a drink from sunflower husks, similar to tea or coffee today. They even used the stalks for heating – a truly versatile plant.

Native American Recipe: Sunflower Seed Kernel Cake.

This cake requires:

2 ½ cups of hulled sunflower seeds,

3 cups of water,

6 tablespoons of finely ground cornmeal,

3 tablespoons of maple syrup, and

½ cup of sunflower oil.

Preparation: Boil the sunflower kernels for about 1 hour, drain, and grind them. Then mix in the syrup and cornmeal. Slowly add the sunflower paste and water, mix well, and form about 15 balls. Flatten the balls into cakes and bake them in heated oil on both sides. Drain the cakes on paper towels in a bowl. Serve warm and enjoy!

George Robert Morgan and Ronald Widon published a paper in 1990 entitled "Oglala Sioux Use of Medicinal Herbs." We'll come back to this fascinating publication in a little while, for this story requires a suitable introduction.

Interesting fact: The Lakota are one of the seven Sioux tribes and live in the Pine Ridge reservation in the southwest of South Dakota. This is one of the largest reservations in the United States, and it is pretty distant from larger places of habitation and main roads, lying as it does at the border with Nebraska. As the authors state, the population of Native Americans at the census of 1984 was 16500, while newer data shows that the population has risen to nearly 30000 inhabitants. While the reservation area is vast, reaching 8984 square kilometers, only

five percent of this is arable. This reservation is one of the poorest parts of the United States. In 1890, a tragic event occurred for this group.

On December 29th, an event known as the Wounded Knee Massacre took place near a place called "Čhaŋkpé Ópi Wakpála" in the Lakota language. This event is also called the Battle of Wounded Knee, but it resembled a battle in name only. Nearly 300 members of the tribe were brutally killed. The army opposed the holding of the Ghost Dance ritual, which they considered dangerous and war-like. On the morning of December 29th, the US cavalry entered the camp to disarm the Lakota. One version states that during the surrender of weapons, a Lakota man named Black Coyote, who was allegedly deaf, refused to relinquish a rifle, which accidentally discharged, prompting the army to open fire on the Lakota who were already partially disarmed. This escalated into a gruesome massacre. Between 250 and 300 tribal members were killed, including women and children. Twenty-five soldiers were also killed, and more were injured, as the Lakota, despite being largely disarmed, engaged in an unequal fight. This was not a battle, but a manifestation of deep-seated racism and revenge. Nineteen soldiers received the Medal of Honor for their participation. However, more than a century later, both houses of the US Congress adopted a resolution expressing "deep regret" for the massacre that occurred on December 29th.

The story is difficult even to read, and to describe this event and what preceded it would require all the pages of this book. But I must mention one name, because it is connected to this story and my childhood, and to the love my entire generation had for Western films. That is Tȟatȟáŋka Íyotake, or Sitting Bull, chief of the Lakota and leader of the Sioux in their struggle for survival. He led 3,500 warriors in the Battle of Little Bighorn on June 25, 1876, achieving one of the most significant victories. American General Custer died in that battle. The reason Custer attacked the Lakota was the Indians' resistance to displacement and the white men's intrusion driven by the hunger for gold. However, despite the victory, Tȟatȟáŋka Íyotake had to flee to Canada due to starvation. The American government pardoned him in the summer of 1981. He was a close friend of Buffalo Bill. He continued to lead the resistance against the oppression of the Indians, and the primary weapon wasn't rifles, but the Ghost Dance, which invoked the return of their stolen land. Two weeks before the massacre at Wounded Knee, Tȟatȟáŋka Íyotake was killed for resisting arrest. Tȟatȟáŋka Íyotake wasn't always called that. As a young man, his Indian name was Húŋkešni, meaning "slow." But in one battle against the Crow tribe, he distinguished himself as a young man in combat, and his father decided to change his name to Tȟatȟáŋka Íyotake upon his return. He lived bravely and died as a true warrior. He was never forgiven for his victory at Little Bighorn, as demonstrated by the massacre of his people in 1890. Despite everything, Tȟatȟáŋka Íyotake entered legend, so even boys in

Yugoslavia, far, far from North Dakota, watched him in the cinema, and afterward made bows and arrows, pistols from corn stalks, and rifles from wood, firing corn seeds – abundant in Vojvodina – imitating the Battle of Little Bighorn. One of those boys didn't even dream that Thathánka Íyotake would return in one of his books, and that they would be connected by none other than the sunflower.

In Sioux culture, and consequently in that of the Oglala Lakota, much like in other cultures worldwide, folk medicine and medicinal plants were widely used. In Oglala tradition, only the "right sort of person" could use them appropriately. The Lakota name for Sunflower is "wahcazi" , which would translate to "yellow flower" and refers to Helianthus annuus. They used it for lung issues and made tea from the yellow "petals" (rather, the ray florets) of the sunflower. Research shows that this same tea was also used to treat diarrhea and general stomach trouble.

Today, in North Dakota, there are about 30000 Native Americans from different tribes, such as the Mandan, Hidatsa, Arikara, Lakota, and others. Although the tribes have different origins, different histories, and different languages, what they do have in common is a respectful relationship with nature. As the word "Dakota" itself means, in Lakota, "friend" or "ally," you can think of it as a symbol of the hand of friendship inviting you to discover the beauty of Native American culture.

Interesting fact: Where do the words "Indian" and "cowboy" come from? In my favorite book by Milan Šipka, "Stories About Words," it states that the word "Indian" is actually a misnomer. In the Middle Ages, it was already known that the Earth was round,

so explorers believed that traveling west would lead them to India and China. Christopher Columbus arrived on the shores of America on October 12, 1492, and when he stepped onto the soil of the Bahamian island of Guanahani (present-day San Salvador), he did not realize he had actually discovered a new continent, thinking he was in India. So he called the native people Indians. And they have remained Indians to this day, having no connection to India. With the films came the cowboys. A cowboy is an excellent horseman, quick on the draw, usually with a Colt pistol, fights for justice, is always on the side of the weaker, and is most often in a fight with dozens of fierce and evil Indians whom he easily overcomes, whether with a rifle, pistol, knife, or in hand-to-hand combat. In fact, the origin of the word cowboy is obvious: "cow" and "boy." In truth, a cowboy was a simple cattle herder, a driver of cows, earning his living with great effort. The expression "bread with seven crusts" is well-established among our people, signifying livelihood earned through hard labor. This proverb could also apply to cowboys. But we also had our own cowboys. As Milan Šipka points out, they were called "dželebdžije." They were our cattle drivers. But no stories were told about them, and so our cowboys faded into oblivion.

Birds attack and feed on sunflower seeds wherever it is cultivated in the world. According to Linz and colleagues, a flock of red-winged blackbirds (***Agelaius phoeniceus***) of around 10,000 individuals consumes between 93 and 142 kg of sunflower daily.

Many birds eat sunflower seeds: sparrows, pigeons, turtle doves, parrots, finches, and many others. For sunflower trials, they are a major, difficult-to-combat pest. Chemical control measures are very limited or non-existent. Birds pose a danger at two stages: after sowing or during crop maturation. Can selection create genotypes more tolerant to bird damage, and how? Most research has been done in the USA and Argentina. This can be achieved in two ways: first, by selecting genotypes for certain morphological characteristics, such as head position, head shape, distance of the head from the stem, etc., and secondly, by selecting for the presence or increased content of certain chemical compounds, such as anthocyanins or tannins, which act as repellents. In some experiments by various authors, as well as in my personal experience, the greatest damage occurs in hybrids of the early maturity group. Data suggests birds prefer oilseed sunflower and those that are easier to peel. But, as is often the case, selecting for a head further from the stem and a greater inclination of the head increases tolerance to birds, but simultaneously increases the possibility of easier neck breakage and water retention on the sunflower heads, and the resulting hybrid may not be aesthetically pleasing. When it comes to sunflower trials, the most common methods of combating birds are covering with nets for smaller trials, then deploying kites, gas cannons, guards with firecrackers and rattles, sometimes falconers are called in, or more recently, the use of lasers has been gaining ground. On large-area plots, as is the case in Ukraine or Russia, where sunflower fields can be 300 hectares, bird damage is not as visible as it is in areas where sunflower is rarely cultivated, where they represent a fantastic meal for the birds.

Recipe for wild pigeon soup:

You need 2 freshly caught wild pigeons,

1 medium-sized onion,

1 pepper,

about 150g of mushrooms,

2 potatoes,

100g of cream,

sunflower oil,

and some parsley.

The cleaned and washed pigeons are cooked, and the meat is then removed from the bones. The pigeons are hunted with very fine birdshot, so you should carefully inspect the meat after cooking. The meat is chopped into smaller pieces. The onion, pepper, and carrots are chopped (I like to chop them in a food processor), add Vegeta[2] (or a similar substitute), and parsley. Cook until the potatoes are soft. At the end, add cream and cook for a little longer. Enjoy.

Canada is the second-largest country in the world, second only to Russia. Numerous indigenous tribes inhabited the territory of Canada before the arrival of Europeans in the 15th century. It wasn't until 1982 that all legal dependencies on the British Parliament were broken by Canadian law. The Canadian Federation consists of ten provinces and three territories, and the country is bilingual. Today, descendants of indigenous peoples make up

[2] Translator's note: A seasoning mix very popular in Eastern Europe and originating from Yugoslavia. It is a blend of salt, spices, dried vegetables, and MSG. Seasoning cubes/bouillon powder may be substituted.

only about 4%, while the majority of the population consists of people of English descent, exceeding 20%. The country owes its name to the Iroquois, or the alliance of five tribes. Today, descendants of the Iroquois live in Canadian-American reservations in New York, Ontario, Wisconsin, and Oklahoma. The French were among the first Europeans to settle in Canada, but in the 18th century, they were militarily defeated by the English and ceded their Canadian territories by signing the Treaty of Paris. Although the country is the second largest, it is sparsely populated, with a population of around 32 million.

In Canada, sunflower is cultivated on only about 40,000 hectares, and are mostly confectionery-type sunflower. It's disheartening for those of us who work with sunflower that, in a country as large as Canada, there are so few fields of them. What remains for Canadians but to photograph themselves in these fields? Several sunflower festivals have sprung up, attracting both amateur photographers and professionals. Some fields even feature props like pink couches and pianos for photos. One festival provides an instruction manual for visitors: follow the signs, no smoking, no drones, do not climb on farm machinery, do not enter the stables, do not litter, etc. But perhaps the best advice offered at these Canadian festivals is what you ***can*** do in a field of blooming sunflower: take countless photographs and contemplate life's big questions, smell the flowers, watch the butterflies, listen to the bees, read a book, draw, write poetry, knit, crochet, fly a kite, play games, breathe in the fresh air, watch eagles soar above the farm, and enjoy time with family. Truly wonderful, isn't it? And the festival entry fee is minimal – 12 Canadian dollars for adults, 7 CAD for children, and free for those under 3.

While Canada may not boast vast sunflower fields, it does have wonderful recipes. Here's one published by Dairy Farmers of Canada. It's simple to make, and the wafers are delicious.

Recipe: Caramelized Sunflower Seed Wafers. You'll need: 60 ml melted butter, 80 ml sifted powdered sugar, 2 egg whites, 6 sheets of thin pastry, sweet paprika (and optionally, hot paprika to taste), 50 ml finely grated Parmesan cheese, 125 g unsalted sunflower seeds. Preparation: Preheat the oven to 190°C (375°F) and line a baking sheet with parchment paper. Combine the powdered sugar and egg whites with the cooled, melted butter, then whisk until the mixture is thick and smooth. Spread the pastry sheet with the whipped mixture, then sprinkle with sweet paprika. Divide the prepared pastry in half lengthwise and widthwise to create 4 rectangles, then cut each rectangle into 4 strips. Transfer to the prepared baking sheet, ensuring the pieces don't touch. Sprinkle the sunflower seeds on top. Bake for about 5 minutes. Repeat with the remaining 4 pastry sheets, meaning three baking rounds. Store in an airtight container; if they soften, bake for a few more minutes and they'll be crunchy again. Enjoy!

In the mythology of the Iroquois, De-oh-ha-ko are the spirits of corn, beans, and squash. These are the three sisters we already touched upon in the last book. There is the belief that the three sisters first grew out of the dead Tekawerahkwa the the Earth Woman , the daughter of Atahensic, the Sky Woman. Tekawerahkwa dies during birth with the desire that after death her body may help the people. From her breast came corn, beans, and squash from her hands and navel, sunflower from her legs, strawberries from her heart, tobacco from her head, and sunchokes from her feet. The three sisters themselves are three beautiful young women who love each other and always want to live together. This serves as an analogy to the three species, which are always best planted together. A legend states that the spirits of the three sisters visited a priest of Seneca Native Americans, who are counted among the Iroquois, named Ganyodaiyo ("Handsome Lake") in 1779. Handsome Lake was a half-brother

to the famous Gaiänt'wakê, Cornplanter. Handsome Lake wanted to take his own life after, in 1779, the American army utterly destroyed Haudenosaunee villages and their inhabitants. He was saved by the visit of the spirits, who inspired him to live and return to his people, teaching them traditional agriculture and leading them in a religious revival.

Asia

Asia is the largest and most populous continent, and according to most geologists, the oldest. It is also the highest continent, and the largest country on the planet, the Russian Federation, extends across it. Asia also contains the highest mountain range – the Himalayas – and the deepest and oldest inland lake – Baikal. It also happens that Asia contains the lowest water surface below sea level – the Dead Sea. Asia comprises 49 countries and has coastlines on three oceans. Before the Suez Canal was built, Asia had a land connection with Africa, and at its northernmost point, it was separated from America by only 92 km. Scientists believe that during the winter, when the sea here is frozen, the ancestors of Native Americans crossed this strait from Asia to America, and the Russians also used this route to settle Alaska. Today, 4.8 billion people live in Asia, which is about 60% of the total world population. The second most populous continent is Africa, and Europe ranks third with around 9% of the total population on Earth. Following the opinion that the Ural Mountains mark the boundary in Russia between its European and Asian parts, it can be freely said that the sunflower is primarily a European culture, but that doesn't mean it doesn't exist in Asia. China is the leading country in terms of both area and production, and Kazakhstan is right behind it. Although mostly located in Asia, Kazakhstan has a portion of its territory west of the Ural River that also belongs to the European continent, representing about 15% of Kazakhstan's territory. Therefore, Kazakhstan, like Russia, is often referred to as an Eurasian country.

How many times have we been entirely convinced of a European discovery, only to find out that it was already used in China centuries ago? Should America celebrate Zheng Day instead of Columbus Day? What does the sunflower have to do with this? During the Ming Dynasty in the early 15th century, Admiral Zheng He commanded the large Ming fleet for thirty years. Supposedly, by order of the court, all records of his voyages were burned, and this mystery has puzzled the world for 500 years. By order of the Chinese Emperor Zhu Li, the admiral was tasked with discovering and visiting new lands. Most historians will say that Zheng definitely did not see America before Columbus, but there are also those who think otherwise, such as Gavin Menzies.

Gavin Menzies, a retired officer of the British submarine fleet, wrote a controversial book titled "1421: The Year China Discovered the World." In the book, he claims that the fleet of Admiral Zheng He discovered America in 1421. Historians have described this hypothesis as pseudohistory, based on sensationalism and revisionism, and developed without the use of standard historiographical methods. Having written a few books, not a few of which were best sellers, Gavin analyzed the role of Chinese explorers in discovering other lands. His last book, "Who Discovered America? The Untold Story of the Peopling of the Americas," serves as a capstone to his four-book opus, where he gets to the main question: who actually discovered America? What is the role of the ancient asian naval tradition? He offers some sort of alternative to people crossing the ice bridge between Asia and North America during the most recent glacial maximum.

In the paper by Liu Gong She and Alain Bonjean, published at an international scientific conference on sunflower held in China in 1996, the authors list that sunflower in China is first mentioned in 1621, and that Wu Qu-Jun, the chinese botanist, illustrated the plant in his book titled, in English, "Textual research about plants

and their names" in 1846. There are still those, however, who believe sunflower reached China through the voyages of Zheng He's fleet, i.e., in the 15th century, and that it was already being cultivated as a crop in the fields of China during the Qing dynasty.

In Chinese culture and mythology, the sunflower represents loyalty as well as an open and vibrant spirit. In Chinese, it is called xiàng ri kuí (向日葵), which translates to "facing the sun," following it on its journey across the sky. Because of this, it is a symbol of devotion and steadfastness. The yellow flowers of the sunflower remind us that it is a messenger of the Sun on Earth, symbolizing warmth, energy, and happiness.

Interesting fact: Chongqing is a municipality and capital city in southwestern China. It is one of the four municipalities under the direct administration of the Central People's Government, along with Beijing, Shanghai, and Tianjin. The municipality is the size of, say, Austria, and has over 30 million inhabitants. As in all of China, the entrance exam for universities in Chongqing is on June 7th and 8th. In June 2023, around 194,000 students took the Gaokao (national college entrance exam) in Chongqing. Everything was as usual, except for one thing: most parents held sunflowers. Holding a sunflower symbolizes "passing the test on the first try." Taking the Gaokao is a significant event for children and families in China. Carrying sunflowers, bottles of their children's favorite drinks, or signs with encouraging messages, these small gestures provide support and love when it's most needed. One parent said that the price of sunflowers had jumped from 3-4 yuan to 15 yuan during those days. So, the sunflower made everyone happy

– those selling them and, above all, those for whom they were intended. Parents' wallets were a little lighter, but if it brought success, it was quickly forgotten. Sunflowers accompanied the Gaokao across China. Where did this custom come from? The Chinese name for sunflower includes a character, 葵, with a similar pronunciation to a word, 魁, in the idiom "yī jǔ duó kuí," (举夺魁), which translates to "winning the title in one move," expressing the wish for their children to pass the exam with top scores on their first attempt. In 2023, 13 million students took the Gaokao in China. I don't know how many students took the entrance exam in Serbia in 2023, but around 27,000 students enrolled in their first year of study. It's like a small village in China.

A peculiarity of China is that today, 90% of sunflower cultivation is for confectionary sunflower, placing China second globally in this area, as Russia reportedly leads in total edible sunflower acreage. Edible sunflower is used practically in every country, even those that don't cultivate them. The Chinese nibble away at about half of their sunflower production. When enjoying some entertainment, the Chinese typically nibble on sunflower seeds, both because it is so nutritious, but also because it is so affordable compared to other plant species that one might also use for nibbling. It also helps that you can only eat one sunflower seed at a time. A typical confectionary sunflower seed in China is quite long and quite large, gray or black with white stripes. Russia is more focused on pure black seeds. Sunflower has a long history in China, but breeding only started during the 1950s. In 1962, the first local sunflower breed was created in China and was named Baikui No. 3. Oilseed varieties of sunflower were dominant in China

until the 1990s, with areas under cultivation rising until 1985, when they reached nearly 1.5 million hectares. After the nineties, things changed, and confectionary sunflower slowly started taking over from oilseed varieties. The start of the 21st century is marked by the use of hybrids, mostly those from the United States and Europe. The prices for F_1 generation seeds were quite high. During this period, each year, more than a hundred hybrids were recognized or introduced. The domination of foreign-sourced hybrids started to decline during the second decade of the 21st century. Not only was local breeding more successful, but it reduced F_1 prices 5-10 times. The Chinese State created a system for connecting all significant breeding programs in the country, aiming to create its own sortment. Results followed. It may sound like something for Ripley's Believe it or Not!, but between 2017 and 2019, China registered nearly 1300 confectionary sunflower hybrids. As is so often the case, it is only a few that dominate the market. The most important region for production is Inner Mongolia and Xinjiang Province. I had the good fortune to attend the Sunflower Festival in Bayannur — unforgettable! If someone offered me to visit the Sunflower Festival one more time or the Olympic Games... Well, you can guess for yourself. Today, China boasts about one million hectares of arable land under sunflower.

Interesting fact: The qipao, cheongsam, or zansae is a beautiful gown worn by Chinese women, and it is very specific and original. One of the most beautiful things I've seen is a cheongsam with sunflower motifs. Cheongsam is inspired by the clothing worn by women of the Manchu people, an ethnic minority in China. Design has evolved over time, and today there are various cheongsam styles, such as the Peking style, the Shanghai style, or the Hong Kong style. It is typically a close-fitting dress with high side

slits above the knees. Cheongsams can vary in length, and while often short-sleeved, they can also be sleeveless. Perhaps because I grew up near the Danube, I find the Jiangnan style the most beautiful, originating from the province where the cities are practically on the water.

Did you know there's a direction in plant breeding called "Space Breeding"? But before we get to that, let me remind you what mutations are. My children asked me that question when they were little, while watching Teenage Mutant Ninja Turtles, so I had to explain it to them in the simplest way possible. I don't think I succeeded very well, because none of them later studied any branch of biological science. Maybe they were afraid of mutants, or they were dissatisfied with my explanation. Genetic mutations are changes in the sequence of DNA nucleotides that are passed on to the next generation. There are several classifications of mutations, but let's stick to the topic of division into spontaneous and induced mutations.

Spontaneous mutations occur naturally in every living organism, while induced mutations are those caused by humans using mutagens – which can be chemical, biological, or physical. Some of the most important achievements in sunflower breeding have been achieved through mutations. Let's remember the high-oleic sunflower, which was obtained through induced mutation in Soldatov's laboratory in the USSR. I devoted a lot of attention to this area of research, almost as much as to the sources of various characteristics in wild sunflower relatives. That's where my interest in space breeding began. Beyond the ozone layer, where gravity diminishes, where there's no surrounding environment as on Earth, and where the magnetic field disappears, there's a large amount of cosmic radiation. Many agencies have reported that China grew space rice in 2022, after sending it on

their Tianhe module. They sent two types of rice: the first grew up to 30 cm, while the dwarf type grew 5 cm. The International Space Station is well known for its studies in space biology. Such research is carried out to obtain superior offspring through mutations caused by cosmic radiation. Fundamental research gives us answers about the impact of the space environment on living organisms. The Chinese space breeding program dates back to 1987. The attention Chinese scientists pay to space breeding is also evidenced by the fact that they sent around 100 different plant species on the Shenzhou 16 module. When the paper by Yang J. et al. was published in 2012 titled "Morphological variation of mutant sunflower (***Helianthus annuus***) induced by space flight and their genetic background detection by SSR primers" in the journal ***Genetics and Molecular Research***, I was truly fascinated by both the idea and the continuation of that scientific story. Sunflower seeds were sent into space in 2002 on the Shenzhou IV module. This space module was unmanned, but it was fully equipped as if it were carrying a live crew. It took off on December 29, 2002, and landed in Inner Mongolia on January 5, 2003. It also carried plant seeds, one of which, often mentioned in various writings about that journey, was the peony, and as it later turned out, the sunflower. Upon returning to Earth, Chinese scientists raised offspring of these sunflowers for as many as 6 generations before publishing this paper, always in comparison with sunflower of the same origin, but which had not been sent into space. They followed a large number of morphological characteristics such as tubular and ligulate flowers, the shape and color of bracts, fertility, and leaf shape. In the selected plants, they also isolated DNA and then performed SSR marker analysis. The results were fantastic, and a large number of mutant lines were obtained. This confirmed that cosmic radiation is one of the ways we can obtain sunflower mutants for many important characteristics, especially for the very architecture of the plant.

Basic sunflower architecture hasn't changed for hundreds of years, and it's possible that by changing plant architecture, we can increase sunflowers' productivity and competitiveness. A long and difficult path, but not an impossible one. This wasn't the only sunflower journey into space undertaken by Chinese scientists. Later, in 2006, the Shijian 8 return satellite was launched from the Jiuquan Launch Center, carrying over 200 kg of biological material, including sunflower seeds. This satellite was often called the "seed satellite." Finally, let us remember that only a small number of mutations are favorable mutations that can find practical application. Xinhua Agency reported in one article that during the last three decades, the Chinese space breeding program has helped create more than 300 varieties and hybrids of cultivated plants, as well as many other species in forestry and horticulture, and generated an additional revenue of 240 billion yuan (about 35 billion USD), cultivated on about 2.6 million hectares – which would be half of the total agricultural area in Serbia.

India is the most populous country on Earth. I spent almost a year of my life there, and visited it many times. It consists of 28 states and 7 union territories. There is an incredible diversity of languages and dialects in this country. There are 22 official languages in India, and it is primarily a secular country. The number of languages and dialects in India depends on the source you consult. If you were to seek consensus, it could be said that there are over 120 major languages, and about 1500 languages and dialects throughout the country. The largest city is Mumbai, whose municipality has about 20 million inhabitants – almost three times more than Serbia – and the state of Maharashtra, whose capital is Mumbai, has about 115 million inhabitants. The largest number of people in India speaks Hindi. In Andhra Pradesh, where I spent the most time during my stay in India, Telugu is spoken, and it is the third most spoken language in India. Today,

about 8 billion people live on Earth, of whom almost 3 billion live in India and China. About 450 million people live in the EU, almost 7 times fewer than in India and China. The leading religion in India is Hinduism, which accounts for about 80% of the population, followed by Islam (about 14%), Christianity (just over 2%), and other religions. Buddhism represents less than 1% of the population.

This is not a book about India, it is primarily about sunflower, and I do not have the right to stray too far from the topic, although I am drawn to do so. Forgive me, dear readers, for not being able to resist this temptation, and not delving into ancient or medieval India, but into modern India – a period that began around the midpoint of the 19th century. From 1858 to 1947, India was part of the British Raj, and alongside Pakistan and Bangladesh it was under direct control of British colonial authorities. It was an institution of undeniable development and strong foundation, and yet it was defeated. On the 2nd of October, 1869, Mohandas K. Gandhi was born, a man who used non-violence to liberate his country from colonialism. Inspired by Christian anarchism of Leo Tolstoy and civil disobedience of Henry David Thoreau, he developed his "satyagraha" philosophy while working in South Africa, as a result of his resistance to discrimination against the Indian community. He spent almost 20 years in South Africa, a good part of that in prison. The basis of this philosophy is empathy and compassion. Martin Luther King and Nelson Mandela also adopted the basic principles of this philosophy in their struggle. Its main principle is to disrupt the moral balance of the attacker through non-violence. Today, we often encounter strikes, practically everywhere. A strike is one of the non-violent methods of struggle. How many strikes do we see every day: strikes by educators, train drivers, farmers, healthcare workers, and all possible professions. Living a very deep spiritual life and an ascetic

life, Indians bestowed upon Gandhi the title of Mahatma, which in a loose translation from Sanskrit would mean "The Great Soul." Gandhi was a great fighter using non-violent methods. The British Empire was not defeated by the army, cannons, or the navy of India, but by the "satyagraha" created by Gandhi. In 1947, after almost a century under British colonial rule, India became an independent state, alongside Pakistan. The following year, Mahatma Gandhi was killed by a Hindu extremist.

The sunflower is called Surjamukhi in Hindi, and in Telugu, the name is a little more complicated: Poddu Tirugudu puvvu. It is cultivated in two seasons: Kharif and Rabi. Areas under sunflower cultivation have decreased drastically in recent years. While sunflower was cultivated on around 1 million hectares in 2011, mostly due to poorer prices but also due to stronger infection from viral diseases, today it is cultivated on around three hundred thousand hectares. The Kharif season is a period when monsoon rains occur, and the crops cultivated in that period are: rice, corn, cotton, soybeans, peanuts, etc. The harvest of these crops lasts from July to October. The Rabi season is a winter season following the end of the monsoon period, during which plant species are cultivated from October or November to June. Usually, wheat, barley, legumes, sugar beets, and chickpeas are cultivated. Four states in India produce 90% of the sunflower: Karnataka, Andhra Pradesh, Maharashtra, and Tamil Nadu. About 1/3 of the production occurs in the Kharif season, and the rest in the Rabi season. The most common diseases are ***Alternaria***, necrosis caused by viruses, blight, and powdery mildew. Discounting blight, diseases that cause the biggest problems in production in India are minor in Europe. This makes India unique in terms of sunflower breeding. As we can see, it can be successfully cultivated in both seasons. Sunflower in India has a relatively long tradition of cultivation. It was introduced as an alternative oilseed crop around

the sixties of the last century, and it can be cultivated in almost all parts of India. Production is not expensive, and it possesses good tolerance to drought and saline soils. However, it is most popular in the southern parts of India. In India, palm oil is by far the most used, followed by rapeseed oil, soybeans, peanuts, and sunflower oil. Sunflower occupies fifth place, but its consumption is four times lower than that of palm oil. The appearance of cheaper sunflower oil from Russia and Ukraine is currently favorable to sunflower oil. However, this is probably short-term and related to small stocks of palm oil in Malaysia and Indonesia, but it has still been shown that sunflower is a strong competitor. India is the world's largest importer of plant oils.

I carry with me many beautiful stories and memories from India, and some are truly unbelievable. To see a field of a hundred hectares of sunflower is unthinkable in India, for the average size of a farm is but one hectare. Kerala is a state in India that is located in the very south and close to Sri Lanka. It is one of the smallest states in India by area and one of the most densely populated, with around 33 million inhabitants. The name of the state itself means "Land of the coconut palms". There are only traces of sunflower in Kerala, even though it borders Karnataka in the north, the state that cultivates the most of it in India.

The beauty of agriculture also lies in the courage of those who break out of the framework of long-standing traditions and introduce new cultures and other innovations into their production. This is how a producer named Sujit Swami Nikarthil broke the dogma that Kerala is not the best place to cultivate sunflower. I read this amazing report in "The Better India" not long ago, in 2021. Despite the great skepticism of his fellow producers, Sujit sowed about 8000 sunflower plants on his farm with a total area of 2 hectares. He was already known as an unconventional

farmer. He was the first in Kerala to have a floating marigold farm on Vembanad Lake. He not only proved that sunflower can be successfully cultivated in that region, but he also became a kind of "sunflower ambassador," inspiring many other farmers to follow in his footsteps. The story of his sunflowers began to spread like wildfire on social networks, and visitors from all over Kerala and even the neighboring state of Tamil Nadu began to arrive to take selfies or organize photoshoots on his sunflower field. When he saw the influx of visitors, resourceful Sujit set up an improvised fence and a toll booth, and people didn't mind paying 10 rupees for the entrance fee, which is about 10 euro cents.

Believe it or not, around 100,000 people visited his sunflower fields—what the Indians call a lakh. They called it the "golden harvest" because he earned a profit of one million rupees. He continues to cultivate sunflower to this day, but now, they are closer to the road, making it easier for people to park and visit. Sujit simply says, "I didn't do anything special, I just overcame the prejudices against cultivating sunflower in some regions. I sourced hybrid sunflower seeds that I believed were suited to this region, raised seedlings, and transplanted them into the field." Sujit also uses mulching for sunflower seedling production. He invested his profit from the "golden harvest" into purchasing oil extraction machines. And not only that, he also intercrops cucumbers with the sunflower. Truly a wonderful and inspiring story from a small farm in Kerala, India. If you happen to be in Kerala, don't forget to visit Sujit. The ticket price is currently only 10 euro cents, though it may have risen since then.

The breeding of sunflower lines and hybrids adapted to India is specific due to the diseases prevalent in those cultivation regions. Sunflower necrosis is a disease caused by a virus, first identified in 1997, and represents the biggest problem in Indian sun-

flower cultivation. Plants infected with viruses are severely stunted, and in severe cases, there is practically no seed yield. Sunflower is susceptible to a large number of different viruses. Transmission is most often mechanical or vector-borne. For example, tobacco mosaic virus is transmitted by thrips, other viruses by aphids, and different vectors are involved depending on the virus. The best defense against viral attacks is to cultivate tolerant hybrids, which requires well-developed testing methods and time. In cases of weaker attacks, the producer can help by manipulating sowing time or promptly removing weeds. Interestingly, it's not recommended to cultivate peanuts next to sunflower, or they should be sown so their flowering periods differ, preventing virus transmission via pollen. In the case of viruses transmitted by thrips, sowing corn or sorghum around the sunflower field reduces thrips migration and windborne pollen (which carries the virus). Chemical control is also possible, but limited, or the use of antiviral agents such as a combination of goat's milk and extract of the bougainvillea plant, which has shown a positive effect in reducing viral infection. In any case, combating viruses is complex.

In India, you will often see farmers protesting, demanding correction of the MSP (Minimum Support Price), including for sunflower. Although the share of agriculture in India's GDP is declining due to the rapid growth of industry, it remains significant. In the 1990s, agriculture accounted for around 35% of India's GDP; today, it's "only" 15%. For comparison, in the USA, agriculture accounts for around 5-6% of GDP, in Germany, around 1%, and in Serbia, between 5-6%. So, even in India, the share of agriculture in GDP is still very significant. The introduction of the MSP significantly improved the position of farmers in India, although its importance varies from state to state. To avoid building its own reserves through direct purchases from producers, the state introduced the PDPS (Price Deficiency Payment System), where the

state covers the difference to the producer when the price of the goods sold is below the MSP. This allows the state to help producers maintain and improve production without being obliged to buy and store the goods at the MSP. Although the MSP has a positive effect on producer profitability, it must be accompanied by other measures, especially regarding restrictions or bans on exports, and high export duties. But that is a topic for the economists of this large country. That is why you will sometimes see protests by farmers in India demanding correction of the MSP.

India is full of wonderful recipes with sunflower seeds. I suggest one recipe called

Fried Sunflower Seed Balls:

For that you need: 100ml roasted sunflower seeds,

100ml roasted chickpeas,

100ml powdered sugar,

2 tablespoons melted butter,

½ teaspoon cardamom powder, powdered coconut,

2 tablespoons dried fruit of your choice,

1 teaspoon sesame seeds.

Preparation: Mix the sunflower seeds and chickpeas, and then blend the mixture. Add cardamom, dried fruit, and powdered sugar and mix well. Then add melted butter, some powdered coconut, and sesame seeds, and mix well again. Make balls and roll them in the remaining powdered coconut. Enjoy!

Approximately a 3-hour drive from New Delhi, the capital of India, lies the city of Agra in the state of Uttar Pradesh. There you will find one of the Seven Wonders of the World, the Taj Mahal. This stun-

ning marble building was commissioned by Mughal emperor Shah Jahan as a tomb for his wife Mumtaz Mahal, who died in childbirth following the birth of their fourteenth child in 1631. It is situated on 42 hectares of land with a magnificent garden, a mosque, and other accompanying buildings. The Taj Mahal took 22 years to build, employing 20,000 workers. It is truly a monument to love. The chief architect is considered to be the Iranian, Ustad Ahmad Lahauri. During the Indian Rebellion of 1857, the Taj Mahal was vandalized by British soldiers who stole its precious stones. Reportedly, British Lord William Bentinck planned to demolish the Taj Mahal and sell the white marble. At the end of the 19th century, the British Viceroy of India, Lord Curzon, ordered a thorough restoration of the Taj Mahal, which was completed in 1908. Today, the Taj Mahal receives 7 to 8 million tourists annually. I had the opportunity to travel by train from New Delhi to Agra and visit the Taj Mahal – an unforgettable journey.

One of the diseases that sporadically and relatively late appears in European countries, where the largest sunflower fields are located, is downy mildew (***Erysiphe cichoracearum*** or ***Golovinomyces cichoracearum***). This disease began to cause more damage in 2007 during the Rabi season. It is characterized by high humidity and appears after flowering, with a distinctive whitish powdery mass on the leaves – these are the conidia and mycelium of this fungal disease. The yield of seeds can be reduced by up to 50% with a severe attack. While fungicides can provide good protection, it is possible to breed sunflower for resistance. A number of wild sunflower species have shown a great tolerance to this illness. Research conducted in India indicates that these are two separate genomic loci that control downy mildew resistance, though there are competing results. Either way, the genetic mapping studies have identified chromosomal regions responsible for downy mildew resistance, which has blazed a path forward for using markers to create resistant lines and hybrids.

Recommendation: There are numerous books for children and adults featuring sunflower, as well as many artistic works on the subject. I have read or seen many of them, but one book remains particularly memorable: a combination of story and beautiful illustrations by author Jayanti Manokaran. The title is "Sunflower and Butterfly," first published in 1993 by the National Book Trust, India. I sincerely recommend it with afternoon coffee or tea.

The name Iran is ancient; the ancient Iranian name was Aryanam, or the land of the Aryans. Until the 20th century, the common name was Persia. The first Persian Empire, or Ancient Persian Empire, was the largest empire in the Ancient world, stretching over almost 11 million km^2. For comparison, the Roman Empire at its peak covered an area of 6.5 million km^2. The term "Aryan" was used by Indo-Iranian peoples as a self-identifier, fundamentally religious, cultural, and linguistic, not racial. The theory of an "Aryan race," originating with the work of Joseph Arthur Gobineau, considered the founder of racism, and later adopted by the founders of apartheid and the basis of Nazi racial ideology, has essentially no connection, beyond the name "Aryan," with any racial ideology originating from Iranian roots.

Although people appear to differ in many morphological characteristics – such as height, hair color, skin color, and eye shape – and although we communicate in different languages, fundamentally we are all very similar genetically, and the concept of the existence of "race" in humans is not only outdated but also scientifically unsustainable. Delving deeper into the study of DNA and the average nucleotide diversity of humans reveals that it is far smaller than in most other species. We are practically identical in 99.9% of cases. Of the total genetic variability, 85% represents individual differences, and only 15% represents differences between populations. In other words, children from one class in Novi Sad, Serbia, differ more from each other than a class from Novi Sad differs from

a class from Tehran. Simply put, science says it is not possible to classify people into races. Even Carl von Linné, the famous Swedish naturalist and "father of taxonomy," divided the human species into four groups based on skin color: red-skinned, white-skinned, melancholics, and phlegmatics. According to that theory, in winter I am probably white, when summer comes I become reddish for a few days, then I turn into a phlegmatic, and finally back to white in winter. Which group do I fall into, according to Linnaeus? Probably none. Maybe into some European chameleon, but there aren't any of those, according to Linnaeus. Oh yes, to add, the European chameleon is called ***Chamaeleo chamaeleon*** in Latin. The father of taxonomy gave me a chance to be categorized somewhere.

Iran today is a country that covers 1.6 million km^2, or three times the size of France and about 18 times the size of Serbia. It has a population of around 90 million. It borders Azerbaijan and Armenia to the north. A large Azerbaijani community lives in northern Iran, numbering around 17 million, significantly more than the population of neighboring Azerbaijan. Islam is the dominant religion, and Persian is the most important language. Iran is mostly a mountainous country with many places worth visiting, one of which is certainly Persepolis. The most important branches of Iranian industry are energy and agriculture. Iran ranks 2nd in the world in natural gas reserves and 4th in the world in oil reserves. It consistently ranks high in many areas of plant production, notably Iranian saffron, pistachios, dates, watermelons, stone fruits, wool, and is the world leader in the production of hand-woven carpets. It is also a leading country in the development of space and nuclear technology.

Sunflower in Iran is a relatively new crop, introduced in the 1960s. By the 1970s, it was cultivated on more than 100,000 hectares. Most sunflower areas are under irrigation. Iran is among the top countries in the world in terms of irrigation, and the

price of irrigation to enable economic production is still worth it. The average rainfall in Iran is 250mm, 33% of the world average. Drought is the most significant limiting factor in production in Iran. One of the very common diseases of sunflower in Iran is charcoal rot (***Macrophomina phaseolina***). It is a typical disease for regions with temperate and hot climates. Symptoms appear after flowering; plants wilt rapidly, mature prematurely, and the most characteristic symptom is necrotic spots on the lower part of the stem. To be sure that this is indeed the disease in question, it is best to cut the stem lengthwise at the base and look for the presence of a large number of microsclerotia. Resistance to charcoal rot is quantitative and inherited polygenically. There are large differences in the level of resistance between hybrids, and in addition to breeding, proper crop rotation, optimal density, proper fertilization, and, of course, irrigation when and where possible are important. Chemical control measures using fungicides are also possible. You must be experienced enough to recognize this disease, as it is often incorrectly identified as early maturity, while the main cause is actually charcoal rot. Several studies have shown that wild relatives of cultivated sunflower are an excellent source of tolerance to this disease. The causative agent of this disease is polyphagous and attacks over 700 different plant species.

Interesting fact: In 2012, a case study was published in the journal Medical Mycology Case Report by Premamalini T. et al. A 70-year-old woman presented with pain, narrowing, and swelling of the right eye. Ophthalmic and microbiological examination confirmed fungal keratitis caused by the fungus Macrophomina phaseolina. The patient responded well to treatment with voriconazole. According to available literature, only a few patients have been reported with infections caused by this fungus, either as keratitis or cutaneous cellulitis, and

all had compromised immune systems. The first reported patient with a disease caused by this fungus was in 2008 – a Canadian born in Sri Lanka who underwent a kidney transplant in India. DNA analysis confirmed that the causative agent was Macrophomina phaseolina.

Pakistan currently cultivates sunflower on slightly more than 100,000 hectares, having been introduced as a crop in the 1980s. Previously, the area under sunflower in Pakistan reached as high as 400,000 hectares. The decrease in acreage is due to the high cost of imported seed, limited storage and preservation capacity for the grain, weak promotion of the crop, and increasing wheat prices. It is primarily cultivated in the provinces of Punjab and Sindh. The average yield in Pakistan is around 1.4 t/ha. Similar to India, there are two sowing seasons.

Recipe for Panjeeri: While sunflower cultivation is limited in Pakistan, I can recommend Panjeeri from Pakistani cuisine. Often called muesli or granola, panjeeri is much more than that. It's a traditional Pakistani food made from nuts, seeds, and semolina, used for centuries, and particularly recommended for women after childbirth. Its high content of plant fats and calories aids postpartum recovery and lactation. It's also recommended postoperatively for faster healing and is a great snack for children. Some consider Panjeeri a superfood. This recipe comes from Fatima, a young mother, and is based on her mother's original recipe – feel free to adapt it to your taste.

Ingredients: butter (usually 2-3 tablespoons),

½ cup almonds,

½ cup cashews,

½ cup walnuts,

½ cup lotus seeds (if available; look for it in health food stores),

½ cup pumpkin seeds,

½ cup cornflakes,

½ cup rolled oats,

½ cup sesame seeds,

¼ cup hulled sunflower seeds, and optionally

¼ cup of gum arabic, two tablespoons of flax seed,

¼ cup of raisins or sultanas, and one cup of semolina.

Add ¼ cup sugar, or more to taste.

Preparation: Melt 2 tablespoons of butter in a frying pan or pot and lightly fry the almonds over low heat until browned, then drain and set aside in a large bowl. Fry the cashews using the same method as the almonds and set aside in the bowl. Repeat with the walnuts. Also, fry the lotus seeds in butter, noting that they absorb a lot of fat. When crunchy, they are ready and can be set aside with the other ingredients. Fry the pumpkin seeds until golden brown. Fry the sesame seeds. Fry the rolled oats until dark brown. If you run out of butter, add more. Fry the hulled sunflower seeds over low heat. Sunflower seeds darken when frying, but also develop a characteristic aroma. Add flax seeds and fry for 3-4 minutes. Fry the raisins until plump, but be careful, as they cook quickly. Then, fry the semolina over low heat, stirring constantly, until it darkens. When everything is ready, add the cornflakes and blend everything together. If possible, grind the nuts and seeds separately. Separately mix the raisins, powdered sugar, and semolina, then combine with the rest. Store in an airtight container in a cool place. It doesn't keep for more than a month. Enjoy!

Turkey is a Eurasian state – or, more accurately, an Asian-European – since 97% of its territory lies in Asia and 3% in Europe. However, the largest area dedicated to sunflower is located in Thrace, which is within the European part of Turkey. Due to its historical and geographical position and influence on Europe through the Ottoman Empire, Turkey deserves significant attention in this book. Not to mention, due to its substantial sunflower acreage. Its culture is a blend of East and West, shaped by its location between Europe to the west, Central Asia to the east, Russia to the north, and the Middle East to the south, with a population exceeding 70 million. The two largest ethnic groups are the Turks (approximately 80%) and the Kurds (around 15%). Beyond these dominant groups, Turkey is also home to a diverse array of other ethnicities. Notably, in 2023, Turkey welcomed nearly 50 million foreign tourists, making it the third most visited country in Europe after France and Spain. Sunflower is Turkey's primary vegetable oil source, satisfying approximately half of its needs through domestic production. The sunflower was likely introduced to Turkey in the 1950s by emigrants from Bulgaria, with early cultivation focusing on Russian varieties such as V-8931 (registered in Turkey in 1979), V-1646, and Peredovik. Local breeding programs began in the 1970s. The development of broomrape-resistant hybrids, coupled with government incentives, positively impacted both acreage and productivity. The first locally bred hybrid cultivated in Turkish fields was called TURKAY-1, created by TARI (Thrace Agricultural Research Institute) in Edirne.

When someone working on sunflower hybrid breeding hears "Turkey," the first things that come to mind are broomrape (***Orobanche cumana***) and drought. Broomrape is the most economically significant parasitic flowering plant affecting sunflower. Approximately 40% of sunflower areas fall within zones where broomrape can cause substantial damage. Control measures

against broomrape involve three strategies: crop rotation, breeding for resistance, and chemical control. Broomrape attaches to the sunflower's roots and, lacking chlorophyll, parasitizes the plant, depriving it of water and minerals. Furthermore, a single broomrape plant can produce up to 50,000 seeds that remain viable in the soil for many years. An attack of broomrape can happen very early, and so sometimes a sunflower crop can fail entirely, without the broomrape ever having emerged from the soil. If you were to extract the plants, you'd clearly see that it was due to broomrape parasitism on their root systems. In Turkey, every 15-20 years, a significant expansion and spread of a new broomrape races could be observed. Following the discovery of resistance to imidazolinones, and by pure chance, Syngenta company developed the first resistant hybrid, Sanyay, in 2003, specifically in Turkey. This hybrid was essentially an IMI-resistant version of the well-known hybrid Sanbro. BASF registered a herbicide in Turkey called Intervix®, a combination of imazamox and imazapyr, designed to control weeds and broomrape, protected under the name Clearfield System®. Thus, chemical control simplified broomrape management for producers. However, for effective broomrape control, integrated pest management is best to minimize the risk of developing new races, even those resistant to IMI herbicides.

Interesting fact: I dedicated my entire working life to fighting broomrape, which I rightly considered the global number one problem in sunflower production. In Serbian, in addition to the name volovod, the terms "vodnjača" or "čuma" were also used. And what is čuma? It's the Serbian folk name for plague. In folk belief, the plague is described as a tall, thin, bug-eyed, and ugly woman who, according to belief, comes at night from the attic or through the chimney, carrying

an earthen pot into which she dips arrows with which she kills her victims, especially children. Therefore, even today, you can hear the saying among older people that something "Wreaks havoc, like čuma among children." Consequently, you shouldn't leave unwashed dishes, because the plague is particularly attracted to them and scratches them with its nails, poisoning them. Considering that the plague spread most readily in unhygienic conditions, there was logic to these stories about unwashed dishes. It was believed that the plague feared dogs and water, and one way to fight it was to pull a person through a shirt sewn for one night by nine naked old women. The writer Nenad Gajic, in his wonderful book "Slavic Mythology," mentioned that even Prince Miloš Obrenović secretly ordered a "plague shirt" for himself, his family, and his subjects when an epidemic of plague broke out in Jagodina in 1837. This was also mentioned by Čedomir Antić in his book "Fourteen Dukes and Nine Old Women." In Serbia, there is also Čumindan, celebrated on the day of Saint Athanasius, who is the protector from the plague. It is believed that anyone who falls ill with the plague on that day will not survive, and women do not spin or weave on that day. It is also important that all dishes are kept covered on the day of Saint Athanasius. In the south of Serbia, the story has been preserved to this day of how the devil himself tempted this monk by disguising himself as a beautiful girl who lured him to renounce God. Saint Athanasius saw through her intention and asked her to show him the devil's power by jumping into a small cup. As soon as she did, Saint Athanasius immediately closed the cup and threw it into the

sea. According to legend, that cup floated for years until it was found by some fishermen who opened it. Thus, the devil came out again and today wanders the world tempting and corrupting people. There is a belief that as soon as thunder rumbles, the devil thinks: "Here comes Saint Athanasius," gets scared, and immediately jumps into containers. Therefore, all containers must be kept closed on the day of Saint Athanasius. The Serbian people even avoided mentioning the name of the plague, so they sometimes called it "godmother" or "aunt." Only death remained wherever the plague passed. The plague avoided homes that were clean and tidy.

The plague is caused by the bacterium ***Yersinia pestis***, and the largest pandemic in history was in Europe between 1346 and 1353. It is estimated that it caused the death of 60% of the population of Europe. But where did the pandemic come from? Scientists have noticed that in Kyrgyzstan, ancient burial grounds showed evidence of a sharp increase in mortality around the middle of the fourteenth century, a little before it would show up in Europe. The hypothesis was that this was caused by the plague. The area was on the Silk Road. An expert team of scientists from Germany and Great Britain sequenced DNA from the human remains found in the cemetery, and aside from human DNA, they found that it belonged to ***Yersinia pestis,*** near a lake called Issyk-Kul. Research has shown that the strains of bacteria extracted from the gravesites are very close to the strains believed to have caused the pandemic in Europe in the 14th century. A paper on the origin of the medieval plague was published in ***Nature*** in June 2022. under the title "The source of the Black Death in fourteenth-century central Eurasia." ***Yersinia pestis*** also existed in the Paleolithic period, but it only be-

came very deadly when it began to be transmitted by fleas. Most likely, trade led to the massive outbreak of this disease. Even today, there are places in the world where the plague, or the so-called Bubonic plague, appears from time to time. According to data from the World Health Organization, between 2010 and 2015, 3348 cases of plague were recorded, of which 584 were fatal. In 2020, in the city of Bayannur, in Inner Mongolia, China, bubonic plague was detected in a 15-year-old boy who ate a marmot. The authorities of Bayanur immediately warned the public to report places where they found dead or sick marmots, which are eaten in some parts of China and neighboring Mongolia. At the beginning of 2024, in a rural part of the state of Oregon in the USA, an outbreak of plague was recorded, most likely transmitted from a sick cat to a human. Today, this disease is treated with antibiotics, and the treatment is very successful, especially in the early stages of the disease.

Therefore, perhaps I was not wrong to declare broomrape (our "plague") as problem number 1 in sunflower production in the world. The people did not call it the plague for nothing. The ***Orobanche*** genus encompasses nearly 200 species, many of which are economically significant as parasites on crops like tobacco, carrots, tomatoes, cabbage, rapeseed, and others. However, a large number do not cause economic damage to plants cultivated by humans. Common to all broomrape species is their parasitic nature – they lack chlorophyll and cannot photosynthesize, relying instead on obtaining nutrients from a host plant.

Sunflower is a popular snack in Turkey, and the accumulation of husks on the streets has become problematic. Since 2020, snacking on sunflower seeds has been prohibited by law on Uskudar beach in Istanbul. As the mayor of Uskudar stated, it was a difficult but necessary decision. Fines collected from offenders are donated to people with disabilities. Turks accompanied this with an

interesting video clip that I highly recommend watching. As far as I know, it's generally considered impolite to snack on seeds in cinemas, and I assume a similar etiquette applies on streets, though I'm unsure about forests and fields. Hopefully, that's acceptable.

I saved Kazakhstan for last in my Asian section, as it has always presented a challenge for me. From the beginning of my career, I've believed this large country holds the future of sunflowers. I say large for a reason – it's the ninth largest country in the world by area. Western Europe, consisting of Great Britain, Ireland, France, Belgium, Luxembourg, and Monaco, covers around 1 million km^2. Kazakhstan, in comparison, has an area of approximately 2.7 million km^2. Around 150 million people live in Western Europe, while only 18 million inhabit Kazakhstan. Just for illustration, between 12 and 14 million hectares of wheat are cultivated in Kazakhstan, compared to about 700,000 hectares in Serbia. Today, sunflower is cultivated in Kazakhstan on over 1.2 million hectares, a significant increase from the roughly 400,000 hectares of not long ago. If you want to capture unforgettable photos with sunflower fields, Kazakhstan is undoubtedly the best place. This large country demands specific breeding criteria, requiring hybrids with both drought resistance and a shorter vegetation period. Cultivation regions are most often found in Northern Kazakhstan, Eastern Kazakhstan, Almaty, and Akmola. Kazakhstan is divided into 14 provinces, and three cities have special status: Astana (the capital), Almaty (the largest city), and Baikonur (a well-known cosmodrome). As a sunflower enthusiast, I always tried to stop and photograph a field whenever possible, and I also enjoyed photos taken by others. One photo that stayed with me was a helicopter in the middle of a sunflower field in Kazakhstan.

Lodging is a negative plant trait in most crops, and it is particularly important in tall plants, just like the sunflower. When we

speak of lodging, we refer to root lodging, and not stem-breakage, which can be caused by illness, especially gray stem blight (***Phomopsis helianthi***) or stem elongation. Copious rainfall and over-wetting in spring can cause weak rooting in plants, alongside a larger vegetative mass and taller plants. In high winds, such plants can easily lodge. This is why sunflowers prefers medium rainfall and a drier spring, especially in the latter half, when, in search of moisture, plants will develop a stronger and more developed root system. In times of reduced tillage, it is imperative to consider the compaction of the soil, because it can lead to the sunflower crop developing poor rooting with a characteristic L-shaped root that is very prone to lodging.

Lodging is a critical trait, so any hybrid prone to it should be avoided in production. Lodged plants are practically lost for yield purposes. It's most important to cultivate lodging-tolerant hybrids, but optimizing fertilization (especially nitrogen), regulating soil water (particularly in waterlogged soils), and subsoiling are also important. If the sunflower is irrigated, special attention should be paid to the irrigation method and the amount of water used. Testing hybrids for lodging is one of the most important processes in breeding, and one way to test is by overflying the fields with a helicopter.

Interesting fact: I'll briefly deviate from Kazakhstan and travel to Prokhladny in the Kabardino-Balkarian Republic, located in the North Caucasus region of Russia, a place I suspect few have heard of. While reading the news, I saw a photograph of a Mi-2 helicopter landing in the middle of a sunflower field. This immediately caught my interest, and I wondered if the helicopter was testing for lodging? The news was published in several journals, and thanks to the internet, I was able to read more. It wasn't

testing for lodging; according to the TASS agency, on July 4, 2021, the helicopter, which was performing treatments, had to make an emergency landing – and where else but in a field of blooming sunflowers? It's one of the most beautiful photographs I've saved in my photo archive. According to reports, one of the pilots fled the scene immediately after the emergency landing, prompting a search.

Kazakhstan is a country of incredible beauty and contrast, with wonderful and hospitable people. It is diverse both ethnically and culturally. Although Kazakhs are the largest ethnic group, it is a country of coexistence for many peoples, largely as a result of Stalin's deportations. The Kazakh language is the state language, but Russian is also used as an official language. Kazakhstan is known for its beauty and diversity. You can see snow-capped mountain peaks, lakes, sand dunes, cultural monuments, canyons...

In the north of the Akmola region lies Burabay National Park, which has a beautiful lake. It is often called the "Switzerland of Kazakhstan." The largest national park is Katon-Karagay in eastern Kazakhstan, covering over 6,000 km^2. For those who enjoy hiking, there are two ranges of glacier-covered mountains not far from Almaty. And what can I say about Lake Alakol in southeastern Kazakhstan, with its beautiful nature and crystal-clear salt water? It is of impressive size, for it is 102km long, 52km wide, and its depth reaches up to 54m, like a tiny little ocean. The water has just about every element on the periodic table, aside perhaps from iodine, and a substantial amount of radon marks it. Kazakhstan features a singing dune, as well. In the Altyn Emel nature preserve, there is a sand dune that's over three kilometers long. When the wind blows just so, the dune makes an eerie noise, which the locals attribute to the groans of Genghis Khan who

is, allegedly, buried there. The scientific explanation lies in the sound the dry grains of sand make as they rub against each other. As far as the groaning of Genghis Khan, that you'll have to check for yourself. You don't need to go all the way to North America to see impressive canyons. Two hundred kilometers from Almaty, there is Charyn Canyon or the Valley of Castles, as it is also known. There you can see truly incredible boulders, 150 to 300 meters tall. Kazakhstan is also a country where you will hear many legends, including those about the sunflower.

Interesting fact: The Kazakh film "Sunflower," directed by Elya Gilman, which was shown at many festivals during 2021 and 2022, received around 50 awards. The theme of the film is very current and related to the current generation of boys, and is based on real events. It's the story of a family in which a 14-year-old teenager suffers from internet addiction. The acting of Rashid Musin is fantastic, and he won several awards. Sloboda Mićalović, a well-known actress from Serbia, also stars in the film. At the premiere in Almaty in 2021, the director literally said: "A friend's family lost a child. This film is inspired by that story, and it is a message to all parents around the world. It's hard to be a teenager and resist the pressures of today. We must do everything to be closer to our children and to love them." The film won awards at many prestigious film festivals, like those in Cannes, Venice, Istanbul, Paris, St. Petersburg, and so on. The film was produced by Kazakhfilm Studios together with Stakler Cinema, with the full support of the Ministry of Culture and Sports of the Republic of Kazakhstan.

I assume the older generation remembers a film from 1970 called "Sunflower" (I Girasoli), starring Sophia Loren as Giovanna and Marcello Mastroianni as Antonio, alongside the remarkable performance of Lyudmila Savelyeva as Masha. Quite different from a modern Kazakh story, this film transports us to the time of World War II. Giovanna and Antonio get married, buying themselves "12 days of happiness" before Antonio is sent to the Russian front. After the war, Antonio doesn't return, and Giovanna decides to search for him in the USSR. Scenes from the film were shot near Moscow and Poltava. In the USSR, Giovanna visits sunflower fields, where it is said there is one flower for every fallen Italian soldier. In the end, Giovanna finds Antonio, but he has started a new family with a woman who saved his life and with whom he now has a daughter. I leave it to you to watch the rest of the film and enjoy it. The film was also shown in the US, and in November 1970, it briefly topped the film charts, though, to the disappointment of the filmmakers, it earned relatively little.

I can't omit a story published in 2011, and it concerns none other than Vasily Stepanovich Pustovoyt, because when it comes to sunflower, Pustovoyt's name is unavoidable in Kazakhstan. The story appeared in the journal "Industrial Karaganda." It was written by Valery Ivanovich Mogilnitsky, a journalist and publicist who passed away in 2016, five years after the article's publication. I will only quote some excerpts. He literally says: "Real scientists have no right to live short lives and stop halfway done, for often their greatest discoveries in science come only in their advanced age, after much work, experiment, observation, and experience. Such is the example of the prisoner of Karlag, Vasily Stepanovich Pustovoyt, who lived to be 86." As we've learned in the last book, Pustovoyt was sent to Karlag in Kazakhstan as a prisoner, arrested for anti-Soviet attitudes, agitation, and propaganda, and sentenced to ten years. Later, it turned out, as in so many cases, that

the accusations were false. When he arrived at the intake office of the prison in 1930, and when he shook out the contents of his bag onto the counter, revealing wheat and sunflower seeds, the officer there asked him what that was. Pustovoyt answered instantly, "Seed material; I am a breeder and I wish to plant it here." A younger officer replied, "Then you are at the wrong place, old man. We reeducate people here, we don't cultivate plants. Close the bag and get back in line." The story continues into Pustovoyt's childhood, into his birthplace near Kharkov, where he developed a keen understanding of what it means for wheat to succeed or fail for a family that depends upon it. Much later, while already working on sunflower breeding, he encountered what seemed like an insurmountable problem: broomrape. He then began to search for a sunflower variety resistant to broomrape, intending to use that resistance to transfer it to new varieties and solve, at least temporarily, this problem. He began his search from Kuban to the Don, and then to his homeland, the Kharkov region, and the story goes that he found the source of resistance to this parasitic plant near the village of Taranovka.

A wonderful article by Mogilnitsky, born in Lviv, where he studied journalism, who worked for a time at the Lviv Pravda, but spent most of his career in Kazakhstan. If I were to choose somewhere to live with the entire Earth to choose from, Kazakhstan would likely be among my top choices.

Europe

In Novi Sad, Serbia, there is a part of the city called Salajka. Within Salajka is an elementary school named Vuk Karadžić. I spent one of the most beautiful periods of my childhood there. The boundaries of Salajka are Kisačka and Temerinska streets, and to the north, the Danube-Tisa-Danube Canal. Where does the name Salajka come from? There are no definitive accounts, but it is believed to be derived from the name of a street called Sala Vermeđi until 1900, and is now part of Karađorđeva Street (where I also lived with my parents). The street was named by Salaikan Serbs who moved there from Zala county and from Slavonia and Croatia, and to preserve the memory of the old country, one street got the appropriate name—Sala. Over time, this adapted to Salajka, and thus it has stayed to the present day. This area was primarily inhabited by ranchers and farmers, and was often flooded until the canal was built. The area was first settled by Vlachs from Transylvania, but they later assimilated into the Serbian population, with memories of them surviving in surnames like Vlaškalić and Vlajovan. The people of Salajka were known as melon producers and vegetable farmers.

In Salajka, there's a street called Jovana Cvijić, and at number 33 stands the house where one of Serbia's greatest modern lyricist-poets, Đorđe Balašević, was born and lived. We all remember the song "Some New Kids," where the poet sings:

"And I gamble with life, that old huckster
It pulls a new ace out of its sleeve, each day
And the oldsters tell me:"Now you're the right age!"
While on Jovana Cvijić Street, some other kids grow"

The Vuk Karadžić School in Salajka celebrated its 100th anniversary in 2011. I was part of the generation that still sat in a ***skamija***. I suspect only a few older generations remember what ***skamije*** even are. Later, they were replaced by some second-hand green benches, as I recall. ***Skamije*** are school desks where the seat and work surface are a single unit, often with names of past students carved or etched into them. The work surface opens to reveal storage for books and supplies. I don't know who decided to replace them, but we all regretted it. Đorđe Balaševic also sat at those ***skamije*** and learned. I first saw him then, as he came to play football and hang out at his former school while still unknown, always wary of the "***podbarčani***," the eternal rivals of the people of Salajka. But Bunja, a Salajka legend and later the author of "Oh Salajka, You Are Not Small," was always nearby. Most of us cheered for the Vojvodina football club, going to matches with flags, and I remember getting reprimanded for skipping class to attend. Anyone with a Vojvodina flag got free admission to the stadium. We didn't have mobile phones; we took photos directly in our heads, and my favorite player was Ratko Svilar, the celebrated goalkeeper for Vojvodina. The people of Salajka claim that you are only ***really*** one of them if both your parents were born there. Mine haven't, I am afraid, but I loved and I still do love this part of Novi Sad.

One year, Balašević wrote one of his most beautiful songs, "Your Someone", and two stanzas go a little like this:

In one of those dives, with checkered tables,
and abominable wine
By a hair's breadth I escaped — death by violin
It was a song about sunflower... just too damn sad.
And we don't sing it here, and that's just too bad.

"Kis napraforgó[3]..." That beautiful bold bloom,
For which the Sun itself to Earth fell from celestial blue
To learn why it turns its head towards the gloom?
To learn to spite whom it does not follow the light,
like they all do?

Let's return to the ***skamije***. I read an article from Niš, titled "Children of the 21st Century Acquire New Knowledge in Old ***Skamije***," about the staff at "Radoje Domanović" elementary school deciding to discard some stored ***skamije*** that had been lying there for 20 years. The principal firmly said, "No." The ***skamije*** were so high-quality that they simply sanded and varnished them, restoring their old luster. There were just enough left to furnish one classroom. The old stove also remained. We in Salajka also had that stove, regularly stoked by the school caretaker during the winter. The people of Niš also kept a wooden abacus. Here, I want to quote something we should all remember, the words of the principal of the elementary school in Niš: ***"The primary goal of the school is to keep up with the times and modern technologies, because we work with children who belong to that era, but somewhere deep within us is also the idea not to escape from the past, and to constantly remember who we are and where we come from, and also how children in Serbia used to be educat-***

[3] Translator's note: These words are untranslated in the original. They are Hungarian for "Little sunflower."

ed and in what classrooms they acquired new knowledge of that time." Đorđe Balaševic, for much of his career while the band Rani Mraz[4] existed, had Biljana Krstić as a backing vocalist, now a well-known singer and songwriter for the band "Bistrik." She began her career in the band "Suncokret," (Sunflower), the first group of Bora Đorđević, also known as Bora Čorba. That's how the sunflower can connect all of us.

At the corner of Kisačka and Temerinska Street in Novi Sad is the house of Mileva Marić, later Einstein, Albert Einstein's first wife. As elementary school students, we used to walk to visit that house, and as far as I remember, it wasn't in very good condition at the time. And 2500 km from Novi Sad, in Russia, there is a city called Saratov. In 1910, the foundation stone was laid for the Saratov Experimental Station, and Aleksandar Ivanovich Stebut was appointed director. The first beginnings of sunflower breeding in Russia are linked to the period 1910-1912 at the Saratov and Kharkov stations, as well as at the "Kruglik" experimental field in Kuban. Stebut was not only the founder and director of the Saratov Station, but from 1915, he also became the head of the breeding department, working primarily on breeding varieties adapted to drought conditions. Evgenija Mihailovna Plachek also worked at this station during the most fruitful part of her career, and we have already written about her in the previous book. As early as 1913, she created the Saratov 169 variety, which was characterized by uniformity, better adaptation to drought, and resistance to broomrape, quickly replacing local populations in production, so it was cultivated on about 1.3 million hectares. Soon after, the Saratov-19 variety appeared, and then ultra-early varieties from the program of this station, adapted for regions requiring sunflower with a short vegetation period.

[4] Translator's note: Literally "Early Frost"

What connection does Mileva Marić have with Saratov? Well, Albert Einstein's somewhat forgotten brother-in-law and Mileva Marić Einstein's brother, known in Russia as Miloš Milošević Marić, was a noted scientist and head of the histology department at the Medical Faculty in Saratov from 1930 until his death in 1944, where he spent most of his working life studying mitosis and amitosis, thus laying the foundations for the process of cloning. The life of this man, in the shadow of his much more famous sister, is an incredible story. Miloš Marić was born in Ruma, where, coincidentally, Dr. Atanasije Stojković, one of the first Serbian enlightenment thinkers, was also born. The coincidences don't stop there: Aside from being born in the same place, they both had lives 59 years long, half of which they spent in Russia, and they were both university teachers. After finishing the gymnasium, he attended studies of medicine in Cluj in Transylvania, where there was at the time a significant Serbian community. What we know about him is that he was a student with a wide spectrum of interests, especially in the social sphere. He was an avid student of events transpiring in Russia, for instance. During 1904 and 1905, he lived mostly in Bern, Switzerland, where, at the time, Mileva and Albert lived. This is where the Einstein museum is now. From some of his letters, it seems evident that he was inclined towards the revolutionary ideas that were at the time taking root in Russia. He was probably influenced to adopt these ideas by the large number of Russian migrants he met. As far as can be determined, he was also close to Bela Kuhn, who studied at the same university in Cluj. Even in Russia, where he worked, his story was barely known, until the celebration of 90 years since the founding of the Saratov State Medical University, when remembrance of him and his life were renewed. He spoke four languages fluently. After graduating, he worked for three years at the university psychiatric clinic in Cluj. Practically as a Hungarian citizen, in 1914, although of Serbian origin, he was first sent to the southern front against his Orthodox brethren, and then

to the northern front, where, during the regiment's retreat, he was captured and transported to Moscow. That's where the new life of Miloš Marić begins. A prisoner of war, but above all a doctor, he worked in a military hospital and helped the wounded and sick while also working as a prisoner at the Department of Histology at Moscow University. In Moscow, he met biologist and histologist Professor Vladimir Porfirjevič Karpov (I hope the bust of this scientist is still standing in the city of Dnipro), who soon became the dean of the medical faculty in Yekaterinoslav. In 1917, at Karpov's invitation, he moved to Yekaterinoslav, a city later known as Dnepropetrovsk, and now Dnipro, where he worked as an associate professor, and then as the head of the histology department.

He soon married Maria Vasilyevna Karpova, the daughter of Dean Professor Karpov. Allegedly, he had been married previously but was declared missing, and his first wife was officially declared a widow. When Professor Karpov returned to Moscow in 1925, Marić replaced him. From 1930, he moved to Saratov, where in 1935 he received the title of Doctor of Science and became a professor. Professor Marić was an exceptional and dedicated worker, involved in scientific research and teaching, leading laboratory exercises, and serving as Dean of the German Department. With the rise of Hitler to power, it became clear that Albert Einstein needed to emigrate, and he also received an invitation from Saratov to move to the USSR. In Evgeny Berkovich's publication, "As Grains Between Two Millstones. Victims of Dictatorships in the 20th Century," the words of Boris Shain, an American mathematician who worked at Saratov University until 1979, are cited, stating that Gavril Konstantinovich Hovostin, the former Rector of Saratov University, whose greatest desire was to create a "Gottingen on the Volga," sent a direct invitation to Einstein to move to Saratov in the 1930s. Einstein was already aware of Saratov, as Mileva Marić's brother lived there. Although he sympathized with the USSR, he disliked the Stalinist

dictatorship. Gavril Konstantinovich Hovostin was sentenced to death on January 20, 1938, and executed the following day. Half a year before that, the party leadership of the Saratov region, which supported Hovostin, was arrested and executed. Einstein was perhaps right not to accept the invitation to Saratov, after all. During the Patriotic War, Professor Marić trained doctors for the front and gave lectures, but died on May 3, 1944, of deteriorating health, not living to see the end of the war and the liberation of his first and second homelands, Yugoslavia and the USSR. Little is known about Miloš Marić, and little is written about him in Serbia. The only record about him was left by Đorđe Krstić in one chapter. I hope this injustice will be corrected in the future. Significantly more can be found about this scientist in Soviet and Russian scientific literature. Serbs remember him only as Mileva Marić's younger brother and Albert Einstein's brother-in-law, but he was much more than that. As far as is known, after being captured and staying in the USSR, he never returned to Serbia.

Evgenija Placek and Miloš Marić may have met, though I have never seen any evidence of this whatsoever. Maybe at a Feodor Chaliapin concert? Or in a theater where Vasily Kachalov played? Under pressure from academician Lysenko, the great scientist, Evgenia Plachek had to leave Saratov in 1939.

The beginnings of oilseed production in Serbia are linked to the first half of the 19th century. Before that, in Serbia, mostly animal fats were used. At this time, Serbia was divided between two large empires, the Ottoman and the Austro-Hungarian. Vojvodina, which was a part of the Habsburg monarchy, started producing oil much sooner, especially from rapeseed, and mostly thanks to colonization programs conducted at the end of the eighteenth and the beginning of the nineteenth century, and the arrival of a German population. Aside from Germans, the regions of Bačka and Banat were settled by Slovaks, Ukrainians, Hungarians, and others.

Aside from hemp, Germans also used rapeseed, which was the first widely farmed oilseed crop, and the German population would later spread and settle in Srem as well. Unlike Serbs, who excelled at ranching, Germans farmed well. In Central Serbia, animal husbandry was the chief economic activity, and even Miloš Obrenović, the leader of the country, had originally been a livestock merchant. With the middle class starting to form in the country, the foodstuffs eaten, especially in cities, would be enriched by some imports, including vegetable oils.

The actual start of oil production, however, is tied to the opening of the first vegetable oil factory, when the wealthy Jewish merchant Jakob Lenji built the first oil mill in Vrbas in 1855, which produced crude oil from rapeseed and pumpkin, while refining took place in Budapest and Koprivnica. Sunflower was initially imported. The second factory built in Serbia was in Zrenjanin, and construction began in 1938. Sunflower occupies more and more fields in Serbia, and oil factories are opening in Bačko Gradište and Kruševac.

Sunflower is primarily cultivated over large areas in Vojvodina. In the period following World War II, cultivated areas fluctuated between 30,000 and 60,000 hectares, significantly increasing starting in 1986 when sunflower was cultivated on over 150,000 hectares in Vojvodina. Crisis years for sunflower occurred between 1981 and 1985 due to an epidemic of stem canker (***Phomopsis helianthi***), causing areas to plummet to just 35,000 hectares. In recent years, areas in Serbia have stabilized at around 250,000 hectares, and it is also cultivated in neighboring countries: in Croatia on approximately 50,000 hectares, in North Macedonia on about 10,000 hectares, and in other regions of the former Yugoslavia in smaller amounts. Serbia is also a sunflower oil exporter, particularly to countries within the EU. In Serbia, sunflower breeding is primarily connected to the establishment and

work of the Institute of Field and Vegetable Crops in Novi Sad. Within the Department of Oilseed Crops, a large number of hybrids have been created that are cultivated globally. Beyond hybrids for oil production, those with different oil qualities were also created, as well as confectionary sunflower, sunflower intended for poultry and bird feed, and herbicide-tolerant and decorative varieties. Researchers at this institute significantly influenced global sunflower development through their scientific work and participation in various associations.

Sunflower is cultivated in Hungary on approximately 700,000 hectares, with average yields among the highest in the world. Regarding area within the EU, it ranks fourth after Romania, Bulgaria, and France, though it is in close competition with Spain for that position. Hungarian science has been well-regarded, both in the breeding and in the study of abiotic and biotic plant stresses. We remember the work of Academician Erna Kurnik, Dr. Gizela Nemet, Dr. Jozef Frank, and especially Professor Dr. Ferenc Viranyi, a leading expert in phytopathology, particularly in the study of sunflower downy mildew. However, I would especially highlight one scientist, Professor Dr. Zoltan Hovath, a true sunflower expert, professor at the University of Debrecen, and one of the most deserving figures in the expansion of sunflower cultivation in Hungary. In addition to lecturing, he managed the production of hybrid sunflower seeds on several thousand hectares in Bácsalmás. When traveling from Bajmok in Vojvodina, one simply crosses the border to arrive in Bácsalmás.

Professor Horvath had an interesting youth as, just after high school, he spent two years in the military, serving on an Il-28 bomber, and he even participated, though briefly, in the invasion of Czechoslovakia in 1968. The following year, he got a job at the state farm in Bácsalmás. He was a close associate of the Institute in Novi Sad, and as a sign of respect for him, one of the hybrids was named after him—Zoltan PR. What intrigued me as a young scien-

tist, in particular, was his study of the relationship between broomrape and sunflower, and in particular, the connection between the phytomelanin layer in the seed and the resistance to broomrape.

He worked there for 38 years, and in May 2001, he was dismissed for political reasons. On May 21 of the same year, demonstrations of support for Zoltan Horvat were held. Although promises were made that the company would remain state-owned and continue to benefit the local population, it was sold in 2004, shortly before Christmas. Such was the time, and every era carries its burdens. Zoltan Horvat later retired but remained connected to Bácsalmás until the end of his life. He published over 200 scientific and professional papers and 16 books or book chapters. In 2006, he published a book in Hungarian, "The History of the Jews of the Town of Bácsalmás (1750-1950)," over 400 pages long, containing numerous documents related to Jewish life, with a particular focus on the Bácsalmás ghetto and deportation. He describes the fate of the synagogue, discusses the Holocaust survivors, and details the Jewish cemetery, which was destroyed twice, all based on three years of research. Zoltan Horvat also worked intensively on the protection of rare species, both plant and animal, especially birds. He discovered the existence of several species in the Hungarian fauna, such as ***Opius occlusus***, ***Acanthoscelides pallidipennis***, and ***Aphis nerii***. He is the recipient of many awards in Hungary and abroad. If anyone has ever loved their city and sunflowers, people and nature in general, then that had to have been this extraordinary scientist, businessman, professor, humanist, patriot – a man of broad views and interests. He passed away in 2021, leaving behind a true legacy. It was an honor for me to have personally known Prof. Dr. Zoltán Horvat.

The north of Vojvodina is susceptible to broomrape infestation. For a long time, the problem was managed through breeding, but in the 1990s, a new race of broomrape was observed in northern Bačka, likely introduced from southern Hunga-

ry, where sensitive confectionary sunflower varieties were more widely cultivated. Sandy soils favor broomrape, and often, due to increased drought on these soils, crop rotation is neglected, leading to more frequent return of sunflower – a more drought-tolerant species – to the same fields. Since resistance to broomrape race E is inherited dominantly, the problem was relatively quickly solved through domestic breeding and the introduction of foreign hybrids carrying this resistance. Most sunflower areas in Serbia now utilize Clearfield (CL), Clearfield Plus (CLP), or SU hybrids – or, as they are commonly known globally, herbicide-tolerant (HT) sunflower hybrids. Cultivating CL and CLP hybrids allows for successful broomrape control through the application of herbicides specific to this technology, such as imazamox and imazapyr. This is not the case for SU hybrids, where tribenuron methyl is ineffective against broomrape. Thus, SU hybrids must be resistant to the present races of broomrape to be viable. When choosing a hybrid and technology, attention must be paid to the genetic resistance the hybrid possesses. Often, to quickly address the problem – especially when resistance is inherited dominantly – backcrossing and marker-assisted breeding are used to introduce resistance into the male component of the hybrid (Rf line) because this process is faster. This solves the broomrape problem in the hybrid but not in seed production, where the yield carrier is the female component, limiting hybrid production to areas free from broomrape infestation. If the hybrid is CL or CLP, the problem of controlling broomrape in both the female and male components is solved by applying CL or CLP herbicides, as both components must exhibit herbicide tolerance. In classical hybrids that are not tolerant to these herbicides, the solution is to select fields without broomrape risk. With these hybrids, the best option is to introduce broomrape resistance into the female component over time, as suitable seed production regions without broomrape risk are becoming increasingly scarce. According

to Serbian researchers, the appearance of the race F broomrape was established in Vojvodina in 2018. Most newer hybrid assortments, regardless of whether they are HT or not, carry resistance to race F, thus significantly slowing the spread of this race. The emergence of new broomrape races is most often associated with drier regions and light soils, and is therefore more common in countries like Spain, Turkey, Romania, and Russia, and less so in Hungary or Serbia. However, vigilance and monitoring for new races are always necessary. Physiological races are often impossible to distinguish morphologically, differing only in their ability to infect specific lines and hybrids. Monitoring them is currently possible through differential lines or hybrids. This involves collecting broomrape seeds, sowing them alongside seeds of differential tester lines (in a completely sterile substrate), and then determining the presence of physiological races based on the reaction of the lines or hybrids. This isn't always straightforward, especially with new races, as it requires well-defined differential lines. Due to the lack of such lines for races beyond F, interpretation can be subjective, often leading to confusion among seed buyers. So, for some, a hybrid is designated G, for others H, and so on. Thankfully, the alphabet is long, and as far as I can tell, no one has reached "Z" yet. Thus, there's a Gru race, a Gsp race, etc. Complicated, isn't it, when there are no clear rules?

Interesting fact: Since 2007, Hungary has hosted a national cake-making competition on August 20th, commemorating the founding of the Hungarian state. Saint Stephen died on this day in 1038, having transformed Hungary into a true European Christian nation. The date is also a religious holiday, celebrating the feast of Saint Stephen. Various festivals are held on this day, and that's when the cake competition takes place. In 2007, the winning cake was named "Sunflower," created by Sándor Fodor from the Habcsók pastry

shop in Budapest's 16th district. It's a very demanding cake to make; in my opinion, it's one of the best cake recipes I've ever seen. If your travels take you to Budapest, don't forget to visit this pastry shop and try the winning "Sunflower" cake. You won't regret it. For those who want to make it themselves – and that's only for true kitchen masters – believe me, look for the recipe for ten portions online. There's also a film about 20 minutes long that will surely help you make it correctly, though you'll need either knowledge of Hungarian or a translator. I gave up on it because it's truly for masters of the craft, and Habcsók pastry shop is only 45 minutes from my house.

Leaving aside Ukraine and Russia, which are first on the list in terms of sunflower cultivation area, Romania is next. Believe it or not, sunflower is cultivated on over 1 million hectares in Romania with very favorable climate and soil conditions, but also with a long history of cultivating sunflower from the start of the 20th century. The oldest data about sunflower culture in Romania dates to 1910, when it is mentioned that sunflower was cultivated on about 700 hectares. In the interwar period, the acreage planted with sunflower grew significantly, and sunflower displaced olive oil. Already during the 1930s sunflower was cultivated on over 200,000 hectares. Work on breeding was started in Romania precisely during the thirties, and new, local varieties Maslinica, Uleioasa de Tg. Frumos and Neagra de Cluj spread rapidly. These varieties had lower oil content and more hull by weight; even then, broomrape was a serious problem. Immediately after WWII, the sunflower acreage increased twofold. Russian high-oil varieties like VNIIMK 8931, Smena, Peredovik, Saratov 169, and so on were put into use. Breeders provided new local varieties, too, like Moara Dmenasca, Timișoara 138, Barragan 19, and so on.

The biggest progress in Romanian breeding was made with the establishment of a breeding department in Fundulea, near Bucharest, headed by Prof. Dr. Viorel Vranceanu. The renowned Record variety emerged from this program, completely dominating sunflower production in Romania between 1966 and 1970, with areas exceeding half a million hectares. Believe it or not, this variety was in catalogs of registered varieties up until 2003, and it was permitted to sell it as recently as 2006, so that we can say that it was cultivated in Romania for a full 42 years. Vranceanu believed that hybrids were the future, and from 1966 onwards, he worked exclusively on creating them. He put his idea into practice, and in 1971, the first Romanian sunflower hybrids, Romsun 52 and Romsun 53, were registered and entered commercial production. They were based on nuclear-type sterility, and by 1973, they already accounted for about 20% of the sunflower area in Romania. In most of the world's literature, these two hybrids are considered the first commercial hybrids in the world. A fantastic achievement by a breeding team led by Prof. Vranceanu. All new hybrids from the Romanian selection were based on cytoplasmic male sterility for several years. However, the most significant leap in sunflower production occurred after 1991, when Romania cultivated sunflower on nearly 1.2 million hectares.

Three factors influenced this: the market economy, the growth of processing capacity, and adapted hybrids. Today in Romania, hybrids of foreign breeding programs dominate, reacting more quickly to market demands than domestic ones. Anyone involved in sunflower hybrid breeding for a long time remembers excellent hybrids from the Romanian state program, such as Favorit or Performer. The work of breeders and phytopathologists in discovering resistance to new races of downy mildew is also vital. Production is widespread and requires a robust system of trials to properly regionalize hybrids in Romania, from the very dry regions in the south to the intensive ones in the west, and from regions

where downy mildew is aggressive to those where it is minor. For all Romanians, Viorel Vranceanu is synonymous with the creator of the first sunflower hybrid. Before working on sunflower, Professor Vranceanu wrote a thesis on heterosis in hemp, which likely fueled his strong belief in heterosis in sunflower. If anyone can stand alongside Pustovoyt, it is certainly Viorel Vranceanu, with his vision, knowledge, and dedication – the father of Romanian sunflower breeding. He was not only a scientist and top breeder but also a publicist, and he supervised 22 doctoral students.

While in Eastern European countries, sunflower was widely cultivated for oil production in the early 20th century, in France, they were cultivated as bird feed until the 1960s.

Interesting fact: I don't know if anyone hasn't heard or read about Simon Wiesenthal. Those who haven't, and I think many are younger, should definitely do so, as they have much to learn. His book "The Sunflower," as far as I know, has never been translated into Serbian. And why is it so important? Simon Wiesenthal is also known as a Nazi hunter. He was born on the territory of present-day western Ukraine, in the village of Buchach in the Ternopil oblast. By the end of World War I, Galicia was part of the Austro-Hungarian Monarchy. His father died in World War I as a reservist in the Austro-Hungarian army. After World War I, that region belonged to Poland, but this did not make things any easier for the Jewish population. He failed to enroll at university in Lviv due to quotas for Jewish students, so he completed his architecture degree in Prague. After graduating, he returned to Buchach, married, and everything was fine until 1939, when, after the signing of the non-aggression pact

between Germany and the USSR, the Soviets took over part of Polish territory. This began mass nationalization and cleansing of the "bourgeoisie," and this is what happened to Wiesenthal's stepfather, who was arrested by the NKVD, and who later would die in prison. When the Germans occupied that region in their campaign to the east, even though he avoided execution, he did not escape the camps. After the Janwska camp, he was moved to a camp near Lviv. In August, his mother was sent to a camp where she was murdered, and by September of the same year, most of his and his wife's cousins were murdered. He lost a total of 89 close family members, and he himself avoided certain death several times. To move as much of the population away from the oncoming Red Army, the retreating Germans left 34 prisoners alive, and Simon Wiesenthal was among them. Very few prisoners survived the journey west through Plashov, Gross-Rosen, and Buchenwald to end up in Mauthausen in Northern Austria. He weighed less than 40 kilograms and lay helpless in camp, where the stench was so horrendous that even the most hardened SS guards would not enter. When Mauthausen was liberated by an American armored unit on the 5th of May 1945, Wiesenthal was barely alive.

Aside from his humanitarian efforts immediately after the war, his main goal was always to bring escaped Nazis, responsible for the death of millions, to justice. He sought the elusive Eichmann, who, at the time of Germany's defeat in WWII, simply vanished. In 1953, Wiesenthal already knew that Eichmann was in Argentina. It wasn't until 1959 that Germany informed Israel that Eichmann was

in Buenos Aires and living under the pseudonym Ricardo Klement. There, he was captured by Israeli agents and taken to Israel for trial. Eichmann was found guilty of mass murder and executed on May 31st, 1961. Adolf Eichmann was in charge of the coordination of the plan to exterminate millions of people, Jews in particular, under the designation of "The Final Solution" (Endlösung). He was often called the Chief Executioner of Nazi Germany.

In October of 1966, sixteen SS officers, nine of whom were hunted down by Wiesenthal, were tried in Stuttgart for taking part in the extermination of Jews in Lviv. Among them was Franz Stangl, the commander of concentration and extermination camps, Treblinka and Sobibor in occupied Poland. After three years of Wiesenthal's patient secret work, Stangl was found in Brazil, and in 1967, he was returned to West Germany. He was sentenced to life in prison, and it is there that he died.

During his visit to the United States while promoting his book "Killers among us," published in 1967, Wiesenthal announced that he had found Hermine Ryan, née Braunsteiner, a housewife who lived in Queens, New York. Mrs. Ryan had overseen the murders of several hundred children in Majdanek. There, the prisoners had called her "The Stomping Mare," and she was known for crushing people and children under her jackboots. She was extradited to Germany for trial for war crimes. In 1973, she was sentenced to lifetime imprisonment. She was released on health grounds in 1996 and died three years later.

Wiesenthal's book, "The Sunflower," is one of the most poignant books I have ever read. This book has been and has remained the subject of much polemics, not for this passage, but for other parts.

The book "The Sunflower" contains many messages that evoke emotions and reflection in us, and when we read the book, we always want to return to it as if we haven't fully understood everything. In one part of the book, at the height of the war in 1943, a group of workers from Lemberg (the German name for Lviv in present-day Ukraine) was sent from the camp to a nearby military hospital to clean up medical waste. Wiesenthal was called by the nurse to the bedside of a dying Nazi soldier, Karl S. The soldier asks Wiesenthal for forgiveness for his participation in the killing of Jews. A year ago, he had destroyed a building with 300 Jews within, killing anyone who tried to flee. Having been asked for forgiveness, Wiesenthal leaves the room without a word. The next day, he learns that Karl has died and left him all his belongings. Wiesenthal refuses to take them and asks the nurse to send them to his mother. Wiesenthal wonders if he should have forgiven him. At the end of the war, he finds Karl's mother but doesn't tell her about his involvement in the killing of Jews. Should he have forgiven him or not? This dilemma torments us all even today.

In the book's latest edition, there are 53 answers to this question from different people, compared to 10 in the first edition. These included theologians, political leaders, writers, lawyers, psychiatrists, Holocaust survivors, and even former Nazis, among others.

What they replied, read for yourself. However, to reveal: 34 answered "no forgiveness," 10 answered "forgiveness," and 9 were undecided.

Simon Wiesenthal died in Vienna in 2005 in his home. He was 96 years old. Biographers credit him with uncovering 1,100 major and minor Nazi criminals. On one occasion, he stated "When history looks back I want people to know the Nazis weren't able to kill millions of people and get away with it." Although the hand of justice did not reach all those he wanted, he left a deep mark on the history of this world. God gave him a long life and much to do during his lifetime. He saw sunflowers many times after 1945. Years passed, but they never ceased reminding him of those he had encountered and described in his book, The Sunflower.

On the border between Romania and Ukraine lies one of the most interesting European countries, the Republic of Moldova. Situated between East and West, it has often fallen under the rule of various states throughout its history, only gaining the status of a Principality in the 14th century. It achieved independence in 1991 with the dissolution of the Soviet Union. Two rivers flow through it: the Prut and the Dniester. The Prut River flows into the Danube, which then flows into the Black Sea. Moldova also has a port on the Danube called Giurgiuleşti. The population of Moldova is around 3 million. The majority of the population is Orthodox Christian. Always on someone's path, Moldova is actually a mixture of nations, and the Moldovans themselves are descendants of the Dacians. The national language is Romanian, but a significant portion of the population also speaks Russian. The capital city is Chişinău.

Moldova, largely located in Bessarabia, was under Turkish rule for a long time before being ceded to Russia in 1812. After the Crimean War, Bessarabia became part of Moldavia, only to revert to Russian rule in 1878, and was occupied by Romanian troops in 1918. The USSR created the Moldavian Autonomous Republic in 1924 and annexed it to Ukraine. In 1941, it became Romanian again, only to end World War II as part of the USSR, where it remained until 1991.

Having visited this beautiful country many times, I have organized important meetings and field visits, and it often happened that 90% of the participants had never visited this beautiful country before. Moldova is a land of wonderful and hardworking people, a land of wine, fruit, and sunflowers.

Moldova does not possess significant economic resources, and agriculture is probably the most important sector of the economy. It is believed that French settlers brought quality grape varieties in the mid-19th century, but viticulture and winemaking have been part of their history for thousands of years. Today, winemaking is one of the most recognizable brands of this country. Vineyards cover nearly 150,000 hectares in Moldova. 75% of wineries are in the private sector. In the region I come from, it is commonly said: "The vineyard seeks a servant, not a master," because there is always work to be done in a vineyard. Viticulture is hard work and requires a lot of physical labor. The same is true for fruit cultivation. That is why I said that Moldova is a land of hardworking people.

Sunflower is cultivated in Moldova on surfaces that vary between 300,000 and 400,000 hectares, which makes Moldova one of the biggest exporters of sunflower oil in the EU. However, sunflower is not a new crop for the Moldovans. According to historical records, its cultivation here developed at the same pace as

that in Russia, and according to some data, the production of oil started as early as the 1860s.

Interesting fact: The most extensive wine cellar in the world is in Moldova, it is called Milestii Mici, and it is only 18 kilometers distant from the capital city of Chișinău. The complex has over 250 kilometers of underground tunnels, though "only" 120 kilometers are in use. This wine cellar is in the Guinnessbook of World Records (2007 edition) as the wine cellar with the largest collection of wine in the world, boasting around two million bottles. The second-largest wine cellar in the world also happens to be in Moldova. It is called Cricova, also quite close to Chișinău. This collection is a "mere" 1.5 million bottles. The underground streets and labyrinths of Cricova are, likewise, about 120 kilometers long. This collection boasts wines that belonged to the collections of many historical figures, and even those of the Nazi leader, Herman Goering. If your travels ever take you to Moldova, you must on no account miss a visit to these vineyards. I had the opportunity to visit both, more than once, and each time was unique.

It is no coincidence that many famous personalities have visited these wineries, such as Yuri Gagarin, Lara Fabian, Angela Merkel, John Kerry, Donald Tusk, and Vladimir Putin, who celebrated his 50th birthday in Cricova.

Let's return a little to some forgotten technologies. Seed shedding of sunflower is a very negative characteristic and can lead to serious yield losses both before and during the harvest itself.

This trait is genetically controlled, and all hybrids exhibiting a higher risk of shedding should be removed from the breeding program as soon as possible. In some years, if this negative trait is present, very large yield losses can occur, which will surely signal to the producer that the particular hybrid should never be sown again. In the period when varieties were cultivated – more than fifty years ago – the description of the variety often included a note indicating it was "suitable for mechanical harvesting." Today, it is unimaginable to include such a statement in the description of a hybrid. Probably no younger agronomist would understand that message. However, during the era of variety cultivation, one of the problems was seed shedding, so harvesting was sometimes done manually. The Kuban method was the most well-known method, where 6-7 sunflower heads are arranged on one sunflower stalk with a few centimeters spacing between them. Left on the stalk for several days, until the moisture content of the seeds falls to around 10%, the entire stalk is then cut off – it resembles a "shashlik" – and carried to the thresher or combine harvester adjusted for sunflower processing. This allowed varieties problematic due to seed shedding to preserve yield, reducing losses to a minimum. Try to imagine countries like France, Germany, and Slovakia, where today the proportion of the population engaged in agriculture is 2 or 3%, and needing to find workers for manual harvesting. Even in Serbia, where the proportion of the agricultural population is more than 10%, finding workers for such a task would be practically impossible. What, then, can we do? Select hybrids without seed shedding, of course. Therefore, breeders, when creating hybrids, must keep in mind that, besides China, Tanzania, or India, where manual harvesting is still common, their shedding-prone hybrids have no other market. In those countries, the proportion of the agricultural population is extremely high – more than 40% in India and around 60% in Tanzania. Therefore, some shedding can be tolerated there, as manual harvesting can compensate for it. In wild species, in con-

trast to cultivated sunflower, seed shedding is a positive trait, leading to more successful survival and spread. In other words, from an evolutionary perspective, species with better shedding have a higher chance of surviving and propagating. In a production sense, this is an absolutely negative trait, the opposite of the evolution of the species itself. Therefore, interspecific crosses with cultivated sunflower, intended to introduce certain traits such as disease resistance or drought tolerance, simultaneously increase the chance of introducing negative traits, one of which is seed shedding, characteristic of many wild species. In some crops, certain treatments result in reducing shedding, but I have not heard of such results in sunflower. Therefore, at this moment, it is best to eliminate all shedding hybrids and continue genetic studies of this trait.

Interesting fact: We have heard a lot about Vincent Van Gogh, probably the most famous sunflower painter. We might not even know about his sunflowers and the Yellow House today if it hadn't been for postman Joseph Roulin and his son Camille. Camille lived in a place with many sunflowers. One day, while waiting for his father, the local postman, Van Gogh came out of the train at the railway station. He had no money or friends. Camille and his father helped Vincent move into the house, but Camille also picked a handful of beautiful sunflowers for him. The Roulin family became Vincent's friends, and that's how the series of portraits of the family came about – portraits of Joseph, his wife Augustine, and their children Armand, Camille, and Marcel. Camille was with Vincent when children from the village threw stones at him while he was returning home with his painting supplies. His father then told him: "Don't cry, Camille, people usually do that to those

who are different from them." Soon, Vincent had to leave the place and his friends, taking with him a painting of Camille's sunflowers. Then no one wanted to buy his paintings, but today, you need deep pockets indeed to buy a Van Gogh. Once they threw stones at him, and now you need to book months in advance to get a ticket to the Van Gogh Museum in Amsterdam and see paintings like "The Yellow House" and many others. Laurens Anholt wrote and published this beautiful story in 1994 under the title "Chamille and the Sunflowers." Reading it takes no more than half an hour, but because of the wonderful illustrations and the story itself, you always want to revisit it. Although written for children, I think it appeals to both children and adults. At least that's how I experienced it.

In the previous post, I briefly described beekeeping and its connection to the sunflower. We are all familiar with the use of beeswax, but did you know that sunflower wax also has wide applications, primarily in cosmetic preparations? The wax is mainly found in the sunflower seed shell, in a concentration of 1 to 3%. What role does the wax play? What does it do in the sunflower seed? Isn't this one of those rare coincidences in nature? Of course not. The seed is a world traveler, constantly moving somewhere with one goal: survival and species propagation. The seed must remain in a preserved state, sometimes for years, until it gets a chance to germinate and develop a new plant. Wax plays a key role in seed preservation—and not just seeds. The plant cuticle that covers the surface of the leaf, stem, flower, and all non-woody parts of plants protects them from drought, extreme temperatures, UV radiation, mechanical damage, and infection by pathogens and pests. The plant cuticle mainly consists of a matrix of cutin – an insoluble poly-

ester – and wax. Considering that the seed is the final product of most plant species, it's not surprising that wax is also found in the seed. The seed coat is a protective barrier for the embryo inside, protecting it from physical damage, pathogens and pests, as well as various stresses. The seed coat also causes seed dormancy, preventing germination until appropriate conditions are met, ensuring it survives until the right moment. The seed coat is an important part of species reproduction. Wax is undesirable in sunflower oil and must be removed during refining, a process called winterization. As a byproduct, sunflower wax is obtained, which has its own market value, mainly for cosmetic preparations. Winterization uses solvents and lower temperatures to separate lipids from waxes. The extract is dissolved in alcohol, and the lower temperature allows the compounds to be separated based on their melting points. The resulting winterized oil then undergoes deacidification with deodorization, and finally hydrogenation, completing the process of obtaining refined sunflower oil. The extracted waxes are then further purified by filtration, washing, and drying. Thus, purified sunflower wax is usually in the form of hard pieces or flakes. Sunflower wax is composed of long-chain fatty alcohols, esters, and fatty acids, with a melting point of around 75-80°C, which makes it suitable for cosmetic use. It is added to lip balms, especially for dry and sensitive skin, as it has emollient properties. It improves the texture of cosmetic products, and is particularly interesting because of its high melting point, so products stored in women's bags and pockets do not melt or spoil. This wax is completely natural, so allergic reactions are minimized. In addition, sunflower wax forms a kind of film on the skin and is very suitable for its protection. Adding sunflower wax improves stability and viscosity, and it is also compatible with many other ingredients used in cosmetics.

Interesting fact: Candles can also be made from wax derived from vegetable oils, such as sunflower, and not just from beeswax or paraffin. Making candles is a wonderful gift for friends and relatives. You need minimal materials, experience gained through experimentation, primarily creativity, and a little willpower. You'll need sunflower wax, which you can buy in stores, pharmacies, or online. You'll also need candle containers, a wick, and optionally, a fragrance you like, along with some containers from your kitchen. The wax needs to be heated above its melting point – around 85°C – but be careful not to burn it. Place the wicks in the candle containers and use a wick holder to keep them upright while you pour the hot wax. You can also buy candle wicks of different thicknesses. Wick thickness is crucial for the candle to burn evenly and slowly enough. Cool the melted wax to about 75°C and pour it into the prepared containers with the wicks. Let them cool to room temperature–it should be about 12 hours, but you'll see for yourself when the candle is finished. The rest is a matter of your experimental talent. There's no better gift than one you make yourself, like sunflower wax candles. If it doesn't work the first time, it will definitely work the second, maybe the third. And each subsequent attempt will get you closer to what you wanted. I follow the motto: "If you don't know the answer, conduct an experiment." You have several variables to consider: wax type, wax melting temperature, container, wax tempering, wick thickness, and wax cooling rate. I'm sure you'll find the best combination after a series of experiments.

The sunflower stalk is a part we often forget after harvest, as the main product is the grain or the oil obtained from it. The stalk is most often chopped up and plowed under, which is also beneficial. However, the stalk can be used in many other ways. The bark of the sunflower stalk contains about 48% cellulose and 14% lignin, while the core contains about 30% cellulose and 2.5% lignin. The sunflower stalk can be successfully used for burning or for making paper, and the use of cellulose fibers in combination with other materials has proven excellent for making insulating material. In Europe and other parts of the world, there is increasing legislative pressure to use more materials of natural origin. The sunflower stalk can be one of the options thanks to its mechanical and thermal properties and its environmental impact. Research is very intensive on both the bark and the core of the stalk, depending on the application.

Interesting fact: How much sunflower can be used in various branches of industry is also shown by the example of Jess Redgrave. After graduating with a degree in fashion design and technology from Manchester Metropolitan University, she developed her career in the fashion industry by designing for many international brands. But her design of a rain jacket made from sunflower fibers caught my attention. Fascinated by the sunflower and its role in the ecosystem, while working on a project called "Climafibre," using enzymes isolated from bacteria and fungi, Jess and her colleagues developed a unique process for obtaining cellulose fibers from the sunflower stalk. These fibers were then formed into knitwear and then into fabric. A hydrophobic coating made from wax obtained as a byproduct in sunflower oil refining provides waterproof protection. And the color? They obtained it by

extracting it from sunflower flowers. They are currently working on the commercial development of this product. I sincerely hope they succeed in commercializing this prototype. It looks extraordinary.

The sunflower root is highly branched with a very pronounced main root that is spindle-shaped. The root can penetrate to a depth of up to 4m and a width of 2m. When assessing broomrape infection in trials, we sometimes find broomrape where we shouldn't, on a hybrid that, according to its pedigree and what we know about it, should not be infected. We immediately think it might be a new race. But don't jump to conclusions. Considering that the plots are relatively narrow, we can observe that neighboring hybrids are more infected, which aligns with our expectations.

What happened instead is that the root system of the sensitive hybrid spread horizontally and onto an adjacent plot, reaching as far as 2m from the mother plant, and there came into contact with the broomrape. Root penetration depth varies with rainfall; roots grow deeper in drier years and remain significantly shallower in wet years. On average, the root system constitutes approximately 1/3 of the plant's mass, with the above-ground portion accounting for the remaining 2/3. However, a comparison of scientific publications would likely reveal a 99:1 ratio favoring research on the above-ground parts of the sunflower, with very little attention given to the roots. Studying the root system is complex and challenging, but possible.

The root can be considered the hidden part of the plant, and its location makes its study difficult. Increasing demands for breeding drought-tolerant plants are intensifying research in this area, utilizing specialized techniques such as rhizotrons and minirhizotrons. A technology gaining increasing use involves

installing probes under plant roots and then inserting a recording device that rotates 360 degrees at specific stages of plant development. Installing the probes is a complex process, and the camera subsequently inserted is also expensive. However, the results obtained from these trials are very valuable for studying the dynamics of root system growth and development. The advantage of this method is that the root remains in its natural environment – in the field where the plant has been planted–rather than being isolated in specialized chambers like rhizotrons. It can be readily combined with observations of the above-ground parts, allowing for harvest and comparison of different variants – fertilization, plant protection, growth stimulants, etc., with yield and seed quality. The method isn't new, dating back to the second half of the last century, but the tools have changed dramatically; today, practically all the equipment fits into a small suitcase carried to the field and connected to a laptop. Developed computer programs allow for relatively rapid data processing and analysis.

MARS

Although MARS is often used as an abbreviation for **M**arker **A**ssisted **R**ecurrent **S**election, here the title refers to the planet Mars. The inspiration for this chapter came from an article I read in 2015 about astronaut Don Pettit, who grew a sunflower on the spacecraft in 2012, calling it "my space sunflower." This was not a planned experiment. Don just wanted to enrich his home in space by adding a little greenery in a sea of machines and equipment he was surrounded with. Plants that develop in free fall look different. The sunflower was 1.5m tall, and its stem diameter was 2.5cm, but unlike the sunflower we are used to seeing, the stem of this sunflower was bent and twisted, weaving around the spacecraft window, and bending towards the light. Charles Darwin, a long time ago, posed the question of how a plant determines the direction of its growth. One of the theories is that this is based on the direction of gravitation. There is no better way to do this than to send plants into freefall in orbit. This was done as part of the project HEFLEX, which was an experiment in the field of gravitational plant physiology, planned and executed in a space-borne laboratory in 1983. The goal was the measurement of the kinetic properties of nutation of plants in a low-g environment. Twelve hours before launch, sunflower seedlings were selected. Their growth and development were tracked by video camera. It was observed that, despite a lack of detectable gravitation, the seedlings would rotate both the root and the above-ground

part. It was also noted that the little roots would rotate in broader and broader circles as felt gravity diminished. Gravitation was not needed for initiating nutation, and so Darwin's mystery remained unanswered, though with a variable less to worry about.

Space offers many opportunities for plant research. Protoplast fusion is one technique that allows for the crossing of species that cannot be crossed sexually. One approach involves the use of an electric field, or electrofusion. An experiment from 1993 was designed to perform electrofusion on the second Spacelab mission, also known as D-2, assuming that the success rate of fusion would be significantly higher in microgravity conditions due to reduced cell re-division, a hypothesis that was ultimately confirmed in the experiment.

Space Laboratory D-2 was launched on April 26, 1993, and landed on May 6 of the same year. It had 7 crew members and lasted 9 days, 23 hours, 39 minutes, and 59 seconds, with the primary goals being experiments with microgravity. Of the 88 experiments, four were sponsored by NASA. The rest were experiments from the German program on the impact of microgravity.

Interesting fact: If you watched the film "The Martian" directed by Ridley Scott, starring Matt Damon, you surely remember how he found instructions for cultivating plants, and how he cut the potato tubers into parts and planted them in his Martian garden on 126m2, requiring 40 m3 of water per m2. He had to produce water necessary for his potatoes and almost perished in the first attempt, because, as Matt said in the film, "Fire on the spaceship is a path to a quick end of the journey." However, he created a greenhouse atmosphere with enough water. And you surely remember his facial expression

when he saw the potato sprout. He got 400 potato plants. He replanted the smaller tubers and used the larger ones for food, calling them "Martian organic potatoes." That's why I've always been a big fan of science fiction since my early readings of Jules Verne. The film "The Martian" was based on the novel by Andy Weir and premiered at the Toronto Film Festival in 2015. It was nominated for several awards. But there were other films and books before and after this one, one from more recent cinematography is particularly important, building slightly on Don Petite. The film was called "Passengers" and was released just a year after "The Martian," but with a different message. This film left a considerable mark on my memory and still does to this day. Avalon, the ship in which there are 5000 colonists and 258 crew members, travels from Earth to the planet Homestead II, a journey of 120 years, all due to the collapse of the ecosystem on Earth. Like a slightly modernized Noah's Ark. Due to an asteroid collision with the ship after "only" 30 years, a malfunction caused Jim Preston to wake up 90 years earlier. Realizing his situation, he even considered suicide until he noticed the beautiful (and attractive) Aurora Lane, who was still in hibernation. Initially, not wanting to wake her, he eventually decided to do so. If you've watched the rest, you know, and if you haven't, I'll stop here because the movie is a thriller, a romance, and real science fiction all in one, not to mention a real human story without any aliens, space-creatures, or attacks by Martians on the ship or the Earthlings. And then there is also the story of the space garden.

We have seen many times that what seemed like science fiction a hundred years ago is our everyday life today, such as mobile phones, satellites, drone delivery, electric cars, genomic selection, etc. Let's recall Jules Verne and 20,000 Leagues Under the Sea, a book published in 1869. Today, atomic and all other types of submarines are our everyday life. The same is true today. If a green garden on Mars seems impossible today, it does not mean that it will still be so in thirty or fifty years. The amount of research in this field is incredibly large. What is almost certain is that this Martian gardening will take place exclusively indoors. The atmosphere on Mars is one hundred times thinner than on Earth, with 95% carbon dioxide, only 0.15% oxygen, and 3% nitrogen. The surface layer of the soil is toxic, but the lower layers could be used because they contain carbon, nitrogen, phosphorus, etc. There is little water, and it would have to be extracted. Since Mars receives twice as little light and is very cold, plants would not survive such a temperature. If a closed space were created, soil from the deeper layers of Mars could be used as a substrate, and with the help of artificial lighting, plants could be cultivated. Production could also be organized underground. Another approach is to move towards so-called synthetic biology, producing food with the help of microorganisms. Algae farms can be very efficient for food production on Mars. If we have water, algae can be cultivated in pools, and some algae are very nearly nutritionally complete. Some ideas envision regions on Mars becoming like closed capsules with a climate similar to that on Earth. There are many unresolved problems for such an undertaking, and NASA plans to populate Mars as early as 2050. Does this seem overly ambitious? Certainly today, but perhaps not tomorrow. To populate Mars, food for the settlers is needed first and foremost. Until this is resolved, it will be difficult to populate this planet.

Interesting fact: If you are planning your trip to Mars from Budapest, where I live, it could cost you several million euros or just 300 euros. First, look at which Mars you want to travel to. There is also the town of Mars in France, which is not far from the Loire River. Perhaps that is a safer option for you at the moment, and the ticket is still refundable. But if you want to fly to the planet Mars, you surely remember Mars One, a company based in the Netherlands, which received payments from investors to organize the first colony on Mars. The company was founded in 2012 and failed in 2019. Unfortunately, the ticket was only one-way. It seems the company's fate was the same – one way. Once you went with Mars One, there was no return. But there is someone much more serious and richer than Mars One, and that is Elon Musk. He literally says: "You want to wake up in the morning and think that the future will be great – that's a civilization that flies into space. It's about believing in the future and thinking that the future will be better than the past. And I can't imagine anything more exciting than going up there and being among the stars." His Starship spacecraft is designed for reusable use for both cargo and people to Earth orbit, the Moon, Mars, and beyond. Starship is the most powerful launch vehicle to date. It is planned to be refueled in orbit. A test flight without crew to Mars is planned as early as 2026/27 in order to test, primarily, landing. If everything goes well, crewed landing could begin as early as 2028/29. From that moment, Musk expects visits to Mars to grow exponentially, and the construction of settlements to begin in about 20 years.

It seems that a return ticket to Mars will still be available. And not only that, Elon believes that a ticket to Mars and back will be affordable for mere mortals, and will cost around $100.000. Quite futuristic, no? Well, maybe some of my grandchildren will be able to visit Earth, all the way from Mars. And in Serbia, we will no longer say "Fell from Mars[5]," but "Flown in from Mars," I suppose. Those who are still on Earth will shout: "Mom, mom, here are the guests from Mars." And what their relatives from Earth will prepare for them to eat is another story.

The fact that all of this is very serious is also confirmed by the European Space Agency (ESA), which is developing a meal for astronauts on the way to Mars from plants that can also be cultivated on Mars. This culinary project resulted in 11 tasty recipes created by two French companies. All menus were based on nine main plants that ESA predicts could be cultivated in the greenhouses of future colonies on Mars: rice, onion, tomato, soy, potato, lettuce, spinach, wheat and spirulina – all common ingredients except spirulina, which is a blue-green algae and is a very rich source of protein, calcium, carbohydrates, lipids and various vitamins. These ingredients must make up at least 40%, while the remaining 60% can be additional vegetables, herbs, oil, butter, salt, pepper, sugar, and other spices brought from Earth. Thus, astronauts will be able to eat Martian bread, green tomato jam, and more.

The mission to Mars is significant to me from a very important aspect. Populating Mars is only possible if agriculture develops on Mars. On Earth, things operate differently. If something is unavailable in one part of the planet, it can be easily and quickly purchased from another and delivered within a short period by water, land, or air. Cultivating plants on Mars, and gener-

[5] Translator's note: A Serbian idiom for someone who is very confused and bewildered, as if they had just fallen from outer space.

ally on another planet, will be a real challenge for us Earthlings. To cultivate anything on Mars, a reliable source of satisfactory quality water is essential. Soil seems to be available, but requires amendment. Sunlight is insufficient, and plant production must be supplemented with artificial lighting. A closed space can simulate Earth-like conditions, but only if it has water and a suitable substrate. At this moment, the most rational approach would be to send a "greenhouse" to Mars and assemble it with robots before any human settlement. If plants can be cultivated on Mars, the expansion of the human species into the solar system is likely possible in the future. While sunflowers aren't currently the focus of Martian cultivation research, perhaps someone will try. I can imagine this scenario: the Commodity Exchange in Novi Sad announced that a significant quantity of sunflower oil had been purchased for 400 ED (Elon Dollars) by Mars Oil Ltd. We will need to conduct experiments on preserving oil quality during transport from Earth to Mars, but I believe it's solvable – I already have some ideas.

Most experiments simulating Martian soil substrate show that plant growth is possible. However, the substrate is only one important factor. The availability of water, the substrate's water retention capacity, nitrogen availability, light quality, and the impact of gravity will all affect production on Mars. One way to provide nitrogen is to inoculate plants with nitrogen-fixing bacteria, but experiments simulating Martian soil have shown this isn't very favorable for their development. Plants that will grow in these specific conditions likely need to be adapted to them. We have many technologies at our disposal, such as CRISPR, which will play an important role in the future, particularly in modifying plant requirements for light quality, substrate, increased pH, or adapting nitrogen fixers to Martian soil.

Several projects are being developed in this direction. One example is EDEN ISS, developed in Antarctica to transfer the technology to the Moon and Mars. That container model practically simulates what we need on Mars if we want to settle the planet. What we know for sure is that this is a very complex technological project. A closed system is certainly needed on Mars, like the greenhouse or container developed in this four-year project. It needs to be transported and assembled. It's also necessary to choose plant species on which research and modifications will be focused to adapt to these conditions, while also being nutritious enough to meet the needs of the settlers. Is the movie "Passengers" becoming our reality, or is the settlement of Mars just a difficult desire to achieve? I leave it to you, dear readers, to answer. Will Earthlings experience the settlement of Mars and other planets, or will we turn this beautiful planet of ours into an exhausted ruin in the meantime? It's difficult to answer today. Will any of the four predictions of Stephen Hawking come true – nuclear war, the emergence of genetically modified viruses, global warming, and the development of artificial intelligence that will begin to dominate the planet – or will humanity come to its senses and begin to settle other planets? It's difficult to answer these questions, but if scientific research shows that it is possible to successfully cultivate plants on Mars, perhaps we are on the right path to realizing this fifth prophecy of Stephen Hawking, and that, like in the movie "Passengers," settlers from Earth arrive on another planet, and cultivate sunflower there, and in one of the books published on Mars it says: "The sunflower is a plant originating from the planet Earth."

Biography

Dr. Branislav Dozet was born in 1962 in Sremska Mitrovica, Republic of Serbia. He got his undegraduate, master's, and doctorate at the Agricultural Faculty of the University of Novi Sad. His doctoral thesis was on the topic of sunflower breeding. Until the year 2000 he worked as a sunflower breeder at the Institute of Field and Vegetable Crops in Novi Sad, Republic of Serbia. In 2000 he moves to Hungary where he lives to this day. He spent most of his working life as a sunflower breeder and head of sunflower breeding at Syngenta, where he had the opportunity to lead research projects on every content where sunflower is grown. Since 2019 he is head of sunflower development at KWS. He is the father of six children (three sons and three daughters), and so far has five grandchildren. Among his colleagues he's known by the sayings "No coffee, no work." and "If you don't know, experiment.

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