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REPORT ON THE ACTIVITIES OF
SECTION I

Dear Chairman, dear participants of the
VIIIth International Sunflower Conference.

Over 120 scientists participated in the activities of the Section of genetics, breeding and seed production. Scientists from Bulgaria, Czechoslovakia, Egypt, France, India, Iran, Kenya, Poland, Romania, USA, USSR, and Yugoslavia presented their reports and communications to the Conference. Fifty-four reports were heard on the following six major problems:

1. The state and development of research in creating highly productive varieties-populations and methods of their improvement in the process of seed production.
2. The development of highly productive inter-line and variety-line sunflower hybrids. This relatively new trend in breeding successfully develops in Romania, USA, USSR, France, Bulgaria, Yugoslavia and other countries.
3. Sunflower resistance to main diseases. This problem acquires prime importance due to the increase number of diseases and their wide dissemination.
4. Oil quality problem. Development of sunflower varieties and hybrids with different fatty acid ratios in oil.
5. The development of genetic studies especially on the genetics of immunity, cytoplasmic male sterility and fertility restoration. Studies of the laws of inheritance and of correlation between the main breeding traits.
6. Wider studies and utilization in breeding of the world genetic fund of the cultivated sunflower varieties and of wild relatives.

The content of the reports testifies to a considerably enhanced level of research in the field of sunflower genetics, breeding and seed production. The reporters stated that sunflower

crop is on the upgrade. Acreages and seed production are increasing in many countries. This is especially evident in the USA, Turkey, Romania, the Soviet Union and the Argentine; India, Spain and Iran, which formerly practically did not cultivate sunflower, are now successfully developing sunflower production.

It was proved at the Section that the breeding method developed by Academician V.S. Pustovoit has lost none of its importance. It gives high practical results allowing the creation of highly productive varieties and their improvement in the process of seed production.

The problem of immunity received much attention. Dr. V.E. Sackston (Spain) reported interesting data on the origin and biological properties of one of the main sunflower diseases - downy mildew - and on measures to control, it.

A comprehensive report delivered by Dr. G.V. Pustovoit aroused lively interest. It dealt with the results and prospects of sunflower breeding for group immunity. The author solved this problem by the method of inter-specific hybridization. As a result of many years of research, methods of breeding inter-specific hybrids and of their artificial inoculation by different pathogens have been devised. The inter-specific hybrid populations were developed showing high productivity and high seed oil content with an immunity to 4-6 pathogens. Two varieties - Progress and Novinka - 98.8% resistant to downy mildew, Verticillium wilt, charcoal rot and sunflower moth - at present are under State Varietal Trials. This complex problem is also being successfully solved by breeders in the USA, Romania, Bulgaria and other countries.

Some reports on methods were also heard. The report of I.F. Mamonov (USSR) showed that selection on a rigid infected background along with inbreeding allowed the development of a sunflower variety resistant to new broomrape

rases. The reports of G.N. Fick and D.E. Zimmer (USA) demonstrated the possibility of developing sunflower hybrids slightly susceptible to rust, downy mildew and verticillium. Data on hybrids and varieties resistant to main diseases were reported by Vida Nicolic-Vig (Yugoslavia), V. Vulpe (Romania), V.V. Burlov and S.V. Kostyuk (USSR).

A wide range of sunflower diseases and, in the Southern regions, of pests, necessitate further deepening of the immunity research.

The development of highly productive sunflower hybrids in order to utilize the heterosis effect was a central problem at the Section. Seventeen reports that dealt with it noted a considerable increase of hybrids productivity as compared to the freely pollinated varieties. Breeders have to this date accumulated and evaluated the combining ability of a large number of sunflower inbreds. The Section heard a number of reports that gave information on methods of developing inbreds valuable from the breeding point of view on the results of trials and on the developed of hybrids on their basis (L.K. Voskoboinik, V.G. Voif, A.N. Ryabota, L.P. Dumacheva - USSR; V. Nicolic-Vig, D. Skoric - Yugoslavia; V. Dedio, G. Enns - Canada).

Sunflower hybrid production on the industrial scale is possible on the basis of the CMS assuring 100% hybridization. The CMS studies are a central problem of the heterosis selection of sunflower. This was reflected in the content of reports heard at the Section. The results of studies of the CMS and ways of its utilization were reported by V. Vulpe, F.M. Stoenescu, A.V. Vranceanu (Romania), and V.F. Pimakhin (USSR).

Considerable interest was paid to the reports on breeding fertility restorer lines (V. Vranceanu, F. Stoenescu - Romania, V.V. Burlov, S.V. Kostyuk - USSR) and on the

search of new sources of fertility restorer genes.

Theoretical aspects of breeding were also devoted much attention to. The reports of E.Y. Krokhin (USSR), I. Georgieva-Todorova (Bulgaria), A.O. Omran, Abol-Zakhab and Hailkal (Egypt), D. Skoric (Yugoslavia), A.A. Zali, B.Y. Samadi and A. Sarafi (Iran), etc. gave the detailed analysis of the laws governing the inheritance and correlation of the main breeding traits of sunflower.

The development of highly productive sunflower hybrids resistant to the main diseases is impossible without utilization of the world genetic fund of this crop. The reports of T.V. Rozhkova, A.V. Anashchenko, T.V. Mileeva, and of G.V. Pustovoit and O.N. Krasnokutskaya (USSR) dealt with this problem.

Experimental mutagenesis is utilized in sunflower breeding as a method of developing a diversified initial material. This was reported by A. Sarafi and M.A. Amirshakh (Iran), K.I. Soldatov (USSR), and R.D. Brigham (USA). Chemical mutagenesis was utilized in the USSR to develop an industrial sunflower variety with a high oleic acid content in the oil (75%). The fatty acid content of this oil is close to olive oil. Experimental mutagenesis opens broad prospects for other breeding aspects as well.

The cyto-genetics of some wild sunflower species was covered in the reports of I. Georgieva-Todorova (Bulgaria), and T.S. Fedorenko (USSR), which revealed the causes of their low crossing ability with cultivated varieties and outlined the ways of overcoming this deficiency.

Large-scale production of sunflower hybrids is impossible without a well-organized system of seed production. This idea sounded in the reports of I.A. Onishchenko and F.A. Shepetina (USSR). They outlined the state of seed

production in the USSR informed of the results of the relevant studies and presented recommendations on managerial practices, that assure the production of sunflower seeds with high sowing and yielding properties. Several reports dealt with methods of evaluating seed quality.

The Section is glad to note the participants active discussion of important problems of genetics, breeding and sunflower seed production. Some wishes were expressed that appropriate research should widen and deepen and that international contacts should, develop; new important problems and trends of research were proposed.

The participants of the Section unanimously supported further widening of research on CMS genetics, immunity genetics and the main sunflower diseases. Some proposed to intensify studies aimed at the search of new CMS sources and fertility restorers, at new hybrids and varieties resistant to sclerotinia and at looking for sources of resistance to this disease.

The participants of the Section have come to the conclusion that to-day the higher efficacy of breeding will be promoted by a further enrichment of the world genetic fund of sunflower and by the utilization of experimental mutagenesis as a method of developing initial material with varied traits and properties.

Along with the development of highly productive sunflower hybrids and varieties the participants of the conference noted the importance of a new trend in sunflower breeding the development of varieties and hybrids with varied fatty acid content of oil. This will widen the range of edible vegetable oils and of fats for technical purposes.

The participants of the Conference are in favour of a further increase of exchange of the samples of cultivated varieties and wild

species of sunflower, the exchange of scientific information and an expansion of personal contacts between scientists of different countries, all of which will promote further deepening of scientific research and an increase of the world sunflower production.