



STUDY AND MAINTENANCE OF WILD ANNUAL SUNFLOWER COLLECTION IN DOBRUDZHA AGRICULTURAL INSTITUTE, GENERAL TOSHEVO

D. Valkova, Pl. Petrov

Dobroudja Agricultural Institute, General Toshevo 9520, Bulgaria
Corresponding author: valkova_d@abv.bg

ABSTRACT

The total number of wild annual and perennial sunflower accessions in the collection of DAI is more than 420, and the annuals are 184. They are registered with specific catalogue number in FAO. Annually the accessions from wild species *H. annuus*, *H. argophyllus*, *H. bolanderi*, *H. debilis* (subspecies - *vestitus*, *debilis*, *cucumerifolius*, *silvestris*, *tardiflorus*), *H. neglectus*, *H. petiolaris* (subspecies - *petiolaris*, *fallax*), *H. praecox* (subspecies - *praecox*, *hirtus*, *runyonii*) were reproduced. *H. annuus* accessions were grown in the field and others – in greenhouse for obtaining of authentic seeds from selected plants. The phenological, morphological, phytopathological and biochemical characteristics of all accessions were done. For completeness of data base, the studied accessions were grouped on vegetation period, resistance to diseases and parasite broomrape, oil and protein content, fatty acids content. As donors of resistance to several diseases and broomrape were determined some *H. debilis*, *H. neglectus*, *H. petiolaris*, *H. argophyllus* and *H. praecox* accessions. As donors of high protein content were determined 18 accessions from wild *H. annuus*, and another 13 accessions from the same species were distinguished with varied fatty acids content in the oil.

INTRODUCTION

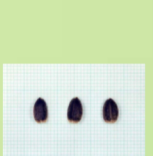
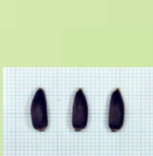
Wild species from genus *Helianthus* possess not only considerable variability for most of the traits but also excellent survival environmental mechanisms. Study of genetic potential of wild *Helianthus* species as an important initial material was a subject in a number of investigations, directed to development of forms, resistant to abiotic and biotic stress factors and distinguished by varied fatty acids content. The extensive research of wild *Helianthus* species from morphological, biochemical and phytopathological point of view contribute for collecting of detailed information for wild sunflower relatives and facilitate the alternatives for suitable initial material for breeding purposes.

MATERIALS AND METHODS

In the investigation were included 31 accessions from wild *H. annuus*, 2 accessions from *H. argophyllus*, 12 accessions from *H. neglectus*, *H. bolanderi*, *H. debilis*, *H. petiolaris* and *H. praecox*. Morphological and phenological characters were conformable with descriptors of IBPGR. Biochemical characters were evaluated on the method of Rushkovski. Phytopathological evaluations of were carried out in laboratory conditions and in artificial infection plot. Evaluation for resistance to downy mildew (*Plasmopara halstedii* Farl. Berlese et de Toni) was carried out on the method of Vear and Tourville (1987). Evaluation for resistance to grey spots on sunflower (*Phomopsis/Diaporthe helianthi* Munt.-Cvet. et al.) was carried out on the method of Encheva and Kiryakov (2002) in field conditions on artificial infection plot. Evaluation for resistance to black spots on sunflower (*Phoma macdonaldii* Boerema/*Phoma oleracea* var. *helianthi-tuberosi* Sacc) was carried out on the method of Fayralla and Maric (1981) in field conditions on artificial infection plot.

RESULTS AND DISCUSSION

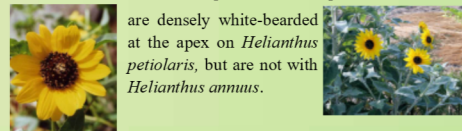
H. annuus accessions were grown in the field. Anthocyanin coloration was observed on cotyledons and stems of plants. Seeds were with different color, size and form.



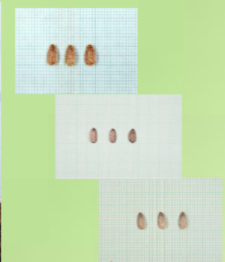
The average height varied from 130 cm to 250 cm.



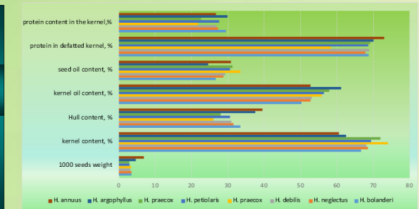
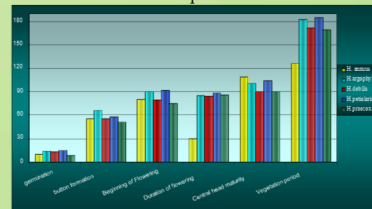
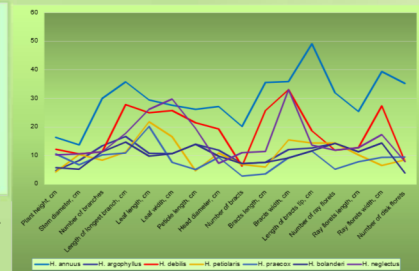
H. argophyllus plants had erect and branched stems with weak or heavy expressed anthocyanin coloration. Thin greyish-white hairs covered stems, leaves, bracts and petioles. The central stem was longer than the branches. Plants have larger central inflorescence and many smaller heads, formed on branches. Characteristics which differ, and help with identification, are the central pales of the composite disk, which



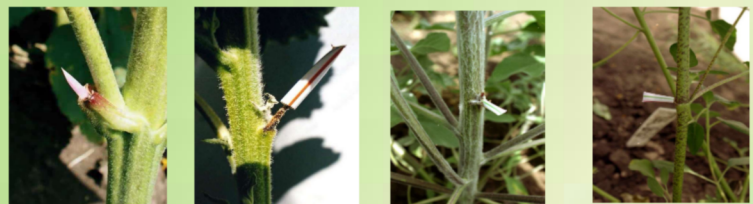
are densely white-bearded at the apex on *Helianthus petiolaris*, but are not with *Helianthus annuus*.



At least 10-15 heads were isolated from each accession. With aim to avoid very low percentage of self-compatibility, pollen from isolated heads was collected and heads were pollinated.



All studied accessions from tested species were evaluated for resistance to phomopsis and the immune ones were isolated.



Full resistance (100%) to the pathogen, caused downy mildew on sunflower showed the accessions E-004, E-035, E-078, E-088, E-092, E-117, E-121, E-121, E-122, E-124, E-128, E-171, E-174 и E-175 from wild species *H. annuus*; accessions E-130 and E-131 from wild species *H. argophyllus*, E-137 and E-139 from wild species *H. debilis*, E-022 from wild species *H. petiolaris*. High percentage of resistance (76-99%) to the pathogen was determined for 9 accessions from the species *H. argophyllus*, *H. debilis*, *H. neglectus*, *H. bolanderi* and *H. praecox*.

CONCLUSION

Genetic resources are the biological basis of global food security. Preservation of cultivars, landraces, and wild relatives of important plant species provides the basic foundation to promote and sustain agriculture. *Helianthus* species were distinguished with their great diversity, different quantity and quality of seed oil and seed protein content. The DAI *Helianthus* collection provides a valuable genetic resource for the improvement of cultivated sunflower. Wild *Helianthus* species have been included in sunflower breeding program in DAI mainly as donors for resistance to diseases. Transfer of genes, controlling the resistance, into cultivated sunflower lines, gave the opportunity for diversification of cultivated sunflower and broadening its gene pool.