GOALS AND RESULTS OF INTERSPECIFIC HYBRIDIZATION IN SUNFLOWER BREEDING

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Extended cultivation of sunflower in recent years, leads to increased phytopathological problems. Among numerous fungal pathogens affecting sunflower, *Sclerotinia sclerotiorum* and *Botrytis cinerea* have the greatest economic impact in Central Europe. The danger of diseases is underlined by the fact that sunflower breeding is solely based on LECLERQ's sterile cytoplasm (cms); other sources of cms are not available, yet. As no major genes for resistance seem to be available in the cultivated sunflower, interspecific crosses are considered promising to overcome susceptibility to major diseases.

Therefore, a crossing programme has been initiated including 23 different wild *Helianthus* species (a gift of Dr. Skoric, Novi-Sad, which we gratefully acknowledge.) So far, these donor species are mainly members of the section Divaricati, which includes about 30 species with varying chromosome numbers (2). The major aim of this programme is to realize as many different interspecific hybrid combinations as possible, using well established methods of biotechnology, e.g. the embryo rescue technique, in a first step.

For extremly recalcitrant combinations (which are not sexually crossable at all), alternative approaches will be necessary. For example, protoplast fusion and and regeneration (1) as well as genetic transformation techniques have to be elaborated or improved, in order to realize all combinations interesting for breeders.

In our first experiment, where we used a male sterile sunflower line (HA89) as a female parent, we could successfully realize the hybrid combinations summarized in table 1; several of these hybrids have already been reported earlier. The table demonstrates that more than half of the possible combinations within the large Divaricati section have already been realized, just by applying embryo rescue techniques. Herewith a vast potential of genetic variability can be exploited.

Table 1. Interspecific hybrids with perennial *Helianthus* species

1. Perennial *Helianthus* species used earlier for hybridizations to *H.annuus* (3,4):

H. eggertii	*H. smithii*
H. occidentalis	*H. hirsutus*
H. tuberosus	*H. strumosus*
H. californicus	*H. laevigatus*
H. resinosus	*H. scaberimus*

2. Species for which interspecific hybrids to *H.annuus* were reported earlier (3,4) and repeated in the present study:

H. decapetalus	*H. nuttallii*
H. rigidus	*H. mollis*
H. maximilianii	*H. giganteus*

3. New interspecific hybrids:
H. angustifolius, H. originalis, X H. laetiflorus

It remains to be tested however, if progeny plants can be selected out of the primary hybrids, which meet our expectations regarding cytoplasmic male sterility, disease resistances and other agronomic characters.

References

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