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EVALUATION OF SUNFLOWER HYBRIDS IN INTERNATIONAL TRIAL PLANTINGS.

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ABSTRACT

A large number of single and three-way sunflower hybrids, representing the most recent achievements of sunflower breeders from all over the world, were tested in 45 locations from 35 European and non-European countries, during the 1976 — 1981 period. The experimentation was performed within the F.A.O. Research Network on Sunflower co-ordinated by the Research Institute for Cereals and Industrial Crops of Fundulea, Romania. This review paper points out the best performances regarding seed and oil yield, disease resistance and adaptability, under the most different environmental conditions.

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PLANT BREEDER'S RIGHTS AND VARIETIES REGISTRATION IN FRANCE.

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ABSTRACT

Sunflower cultivars, like most agricultural crops, are subjected to two independent French laws:

- one to protect breeder's rights entered into force in 1971 in application of the "Paris convention of 1961", is worked out in accordance with U.P.O.V. (Union internationale pour la Protection des Obtentions Vegetales) principles.

- the other to protect seed consumers, has existed for a longer time and is now applied in conformity with E.E.C. (European Economic Community) rules for cultivars registration and catalogue.

Both require preliminary examination of plant material delivered by applicants and this paper intends to explain administrative and technical procedures used.

INTRODUCTION

The breeder who wants to introduce a new cultivar on the French market has beforehand to make this cultivar registered on the French or on the E.E.C. catalogues. To be registered on the E.E.C. catalogue a cultivar has first to be registered in one of the national catalogues of the E.E.C. members countries; a cultivar newly introduced on one of the E.E.C. members countries catalogue has to wait between three months and two years before reaching the E.E.C. catalogue and the other member countries may use this delay to make a circumstantial opposition against the admission of the variety for his own market. A variety duly registered can be marketed without danger, or even with interest for the users, in each country which don't oppose it and, from the legal point of view, registration means authorization of selling but

nothing else. The breeder who wants also to make his rights on the cultivar granted in France has therefore to apply separately for a title of protection. Each regulation works on its own but technical examinations are made by the same testing department; it is why it seems easier to give here a rather mixed presentation.

BODIES IN CHARGE

The C.T.P.S. (Comite Technique Permanent de la Selection) is in charge for cultivar registration on the French catalogue.

It has to prepare and administer regulations in accordance with E.E.C. rules and especially to prepare the decision about each cultivar applied for by the Minister of agriculture, who takes all final decisions.

The C.T.P.S. is composed of officials (Ministry, Research, Teaching...) for one half of representatives of professionals (Breeders, Seed producers, Seed consumers...) for the other half. It is subdivided in "sections" related to the kind of crops, for instance sunflower falls into the "fibre and oilseed crops" section.

It has a secretariat in La Miniere to register applications, to get into contact with breeders and with its own members and to do all the administrative work. It doesn't have any facilities to make the variety testing and it commits a special department of I.N.R.A. (Institut National de la Recherche Agronomique), the G.E.V.E.S. (Groupe d'Etudes et de controle des Varietes Et des Semences) to do the work.

The C.P.O.V. (Comite pour la Protection des Obtentions Vegetales) is in charge for the Plant Breeder's Rights regulations. It has to prepare and administer regulations in accordance with the Paris convention of 1961 and with his following amendments. It has also to take directly decisions about each cultivar applied for a title of protection. The C.P.O.V. is composed of representatives of breeders and officials under the chairmanship of a magistrate. It commits technical experts to give their opinions about varieties under examination.

It has a secretariat, 11, rue Jean Nicot — 75011 Paris, to register applications, to get into contact with breeders and with its own members, to publish the variety gazette and to do all the administrative work. It has no facilities for cultivar testing and commits the G.E.V.E.S. to do the technical work.

APPLICATION TO BE MADE

For catalogue application can be made only for **commercial varieties**; forms must reach the C.T.P.S. in La Miniere before 15th of January. For an hybrid cultivar for instance there are:

- one administrative form to fill in with: names of breeder, maintainer, applicant; type of hybrid; origin of the components with special mention if the breeder wants to keep formula secret and authorization of use if he is not the owner; countries where applications have already been made; reference and denomination to be used.
- one technical questionnaire to fill in with the main D.U.S. (Distinctness, Uniformity and Stability) and V.C.U. (Value for Cultivation and Use) characteristics of the hybrid variety with a special reference to similar known cultivars.
- one technical questionnaire to fill in with the main D.U.S. characteristics of each component (inbred lines for single hybrid, inbred lines plus single hybrid for three way-cross) with a special reference to similar known material.

For Plant Breeder's Rights, applications can be made **either for commercial varieties or for components** in the case of hybrid varieties; forms can reach C.P.O.V. in Paris at any time due to the fact of priority. There are also:

- administrative form to fill in with about the same informations as for catalogue
- technical questionnaires for hybrid and for components to fill in with only D.U.S. characteristics with a special reference to similar known cultivars or materials.

MATERIAL TO PROVIDE

For catalogue, seed material of good quality must reach I.N.R.A./G.E.V.E.S. Le Magneraud B.P. 52 — 17700 Surgères before 1st of February; quantities required are:

- first year of testing: 5000 grains of each component plus 6 kg of commercial hybrid.
- second year of testing: 1.5 kg for each component plus 10 kg for commercial hybrid.

For Plant Breeder's Rights, it is the same as for the catalogue except for commercial hybrid where only 1 kg is required in first year and 4 kg in second year of testing due to the fact there are no value trials.

FEES TO BE PAID

For catalogue the 1982 fees to be paid are: **administrative** 1510 F once; **D.U.S.** 2040 F each year of testing for commercial hybrid and for each new component involved; **V.C.U.** 5000 F each year.

For Plant Breeder's Rights fees are: **administrative** basic fee 600 F; **D.U.S.** slightly different at present as for catalogue but tending quickly to be similar; **no V.C.U.** fee. To keep right into force or variety on catalogue there are also special annual fees increasing with the age of registered or protected varieties.

TECHNICAL EXAMINATIONS

Technical examinations last at least two years and the only, but very important, difference between catalogue and Plant Breeder's Rights is that for Plant Breeder's Rights there are no V.C.U. trials — due to the fact that the law doesn't permit to take into account value characteristic like yield to grant the right. So D.U.S. testing, which is done exactly in the same way for catalogue and for Plant Breeder's Rights, will be presented first and V.C.U. trials, made only for catalogue, will be presented afterwards.

D.U.S. testing is carried out in two G.E.V.E.S. locations in La Miniere and Le Magneraud and with the help of I.N.R.A. breeding station at Clermont-Ferrand to make the hybrid from components given by the applicant. Lay-outs, subdivided according to group of material such as female, restorers, single hybrid... include in the **first year of testing** 2 replications of 2 rows of 12 plants at each location for applications and reference collections (all known and available material from everywhere) plus 2 replications of 5 rows of 12 plants for applications only in La Miniere to test Homogeneity on a larger sample. In the **second year of testing** lay-outs are the same as in first year with, for hybrid, introduction of the sample specially made at Clermont-Ferrand in comparison with the sample given by the applicant. **Characteristics used**, about 35, are all physiological or morphological characteristics known by experience to show genetical variability and good stability in regard to the environmental influence.

They are for instance seed coat characteristics like color or ornamentation, foliage color, indentation of margin... plant branching, head shape... It could be also disease susceptibility when reliable testing methods are available, which is the case for downy mildew.

Characteristics are recorded on each plant or on a group depending on exteriorisation and easiness to do it, at a determined stage and according to a standardized scale to permit valid comparisons.

V.C.U. testing lasts for two years and is carried out in about 20 different locations each year. Locations are chosen in the main production areas and the testing is made in specialized stations like, I.N.R.A., CETIOM (Centre Technique Interprofessionnel des Oleagineux Metropolitains), Agricultural Colleges or directly, for a few of them, at the breeder's station. G.E.V.E.S. is responsible for this testing but it relies mostly on CETIOM which gives help for an important part of the work for the field testing but also for the laboratory analysis.

The experimental principle is to compare new varieties with reference varieties, chosen among the most largely grown ones, in micro trials managed under normal conditions of farming for the considered area, with all conditions equal for each variety. The technical procedure given to the people in charge for a trial includes:

- a recall of agronomical principles for field experimentation
- details related to the lay-out-design FISHER BLOCS with 4 replications or lattice when possible-size of plots (at least 4 rows of 8 to 10 meters and 60cm maximum

- between rows and at last 100 plants by plot)...
- precisions about the management = manuring, cleaning, hoeing, protection against pests and diseases..., harvesting.
- recording to be made — emergence, phenological stages, pests and diseases, lodging, yield...
- sample to collect for laboratory analysis = moisture content, weight per thousand grain, oil content, protein content...

DECISIONS

For catalogue results of studies are prepared by the G.E.V.E.S. under the control and with the help of a commission of experts set up by the C.T.P.S. Once a year, during December, C.T.P.S. section meet in Paris to make its proposals to the Minister of Agriculture.

The basis of these proposals are the following:

for **D.U.S.** a variety is considered as — **sufficiently Distinct** when it is possible to differentiate it from all known varieties included in the reference collection with at least one reproducible characteristic which could be a characteristic of value — **sufficiently Uniform** when commercial hybrid (or cultivar) doesn't show more than 10% of off types and when parents look sufficiently similar to be described with a good security — **sufficiently Stable** when commercial hybrid delivered in first and in second year by the applicant appears to be identical with hybrid especially made during the first year of testing and when parents given in first and in second year by the applicant appears to be identical with a particular attention to the maintainer line which has to be identical with the corresponding female.

for **V.C.U.** a variety is considered to be of sufficient value when its marks averaged on two years are at least 103% of the reference cultivar (s) of the same maturity group. Reference cultivars are chosen each year by the C.T.P.S. but they are not changed during the testing period of a given variety.

Results are expressed as: $A+B+C+D+E$ where:

A is the yield at 0 percent of moisture content in percent of reference cultivar (s).

B is the difference with reference cultivar (s) in oilseed content expressed in percent of dry matter.

C is 1/4 of the difference with reference cultivar (s) for the percentage of plants susceptible to botrytis.

D is 1/4 of the difference with reference cultivar (s) for the percentage of plants susceptible to sclerotinia.

E is 1/2 of the difference with reference cultivar (s) for the percentage of plants susceptible to lodging.

At the end of the two years testing period the C.T.P.S. can propose: acceptance — refusal or postponement for one year more testing. In this last case the applicant has to provide seed again and to pay fees corresponding to the kind of tests asked for. Acceptance proposals are sent by C.T.P.S. to the Minister of Agriculture with **denomination** in accordance with U.P.O.V. principles, **name of breeder** declared by the applicant, **name of maintainer** who is in charge directly, or by authorization of the owner, of the original material used to keep the variety stable.

The Minister can then register the cultivar by arrete and, as soon as it is published in the official Gazette, the cultivar can be sold in France for a period of ten years. This period can be prolonged by five year periods if the cultivar keeps interest for users and if maintenance has been made properly and fees paid in due time. Commercial cultivar only is registered and hybrids' formulas are generally kept secret; officials publications are only made for commercial cultivar but living reference collection and officials descriptions are made for all tested material and are kept at the disposal of officials who need it.

For **Plant Breeder's Rights** results of studies are prepared by the G.E.V.E.S. and subjected to the examination of experts before reaching the C.P.O.V. C.P.O.V. meets three or more times a year, generally in Paris, to take decisions about cultivar having at least two complete years of testing plus one year more checking mainly for a more reliable description.

C.P.O.V., looking only at D.U.S. characteristics, uses the same basis as the C.T.P.S. with nevertheless the following main differences:

- C.P.O.V. can examine a parent line in itself, without regard to the corresponding hybrid if application has been only made for it.

- C.P.O.V. doesn't take into account value characteristics to establish Distinction. So it is quite clear that a variety could be considered as sufficiently Distinct for C.T.P.S. and not for C.P.O.V. and in another way a cultivar could be protected even if it has been rejected by C.T.P.S. for lack of value.

The C.P.O.V. decisions can be — to issue a certificate of protection or to refuse it; there is no postponement at this stage because cultivar files doesn't reach C.P.O.V. as long as there is something to clarify.

The cultivar is provisionably protected during the testing period and the right is granted for 20 years starting from the date of the certificate issue. During this period certificate is valid as long as the owner keeps his variety stable and available (at least at official request) and pays the fees in due time.

The certificate includes a description of the material concerned and can be consulted on request at C.P.O.V. office in Paris; the material itself is kept alive and included in the official reference collection.

CONCLUSION

When people look at them, at first glance French regulations about sunflower varieties seems to be rather complete and expensive. When people check a little more they reach often the conclusion that it is too expensive for the purposes and ask about benefits in regard to costs. It is rather difficult to put that kind of thing in the balance and the answer is generally indirect.

— Description and reference sample are the only way to keep sure that a variety doesn't shift in the course of time.

— A variety known, recognizable and reproducible is the only practical way to **protect the users**, by making seed control possible, to **protect breeders**, by giving them the possibility to defend their rights, to **permit comparison** in the course of time and, for instance, to measure the progress realized by breeding new varieties.

Finally the only question could be to know if it is useful to protect officially breeders, farmers and consumers in our society by the end of the 20th century!