Research Notes: Procedures for handling soybean germplasm between the United States and foreign countries

H. H. Hyland
United States Department of Agriculture

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is that this gene may have regulatory function in activating several genes.

Figure 1. Isozymic variations in the seed coats of black (B) and yellow (Y) seeded isogenic lines of Bragg soybean.

S. S. Malik
B. B. Singh

GERmplASM RESOURCES LABORATORY
PLANT GENETICS AND GERMPLASM INSTITUTE
Agricultural Research Center-West
Beltsville, MD 20705

1) Procedures for handling soybean germplasm between the United States and foreign countries.

Federal, state, and commercial soybean breeders periodically receive direct requests for seed from potential foreign cooperators, including both those who are technically qualified to undertake research and those who have little experience with the crop and are initiating programs for the first time. The Germplasm Resources Laboratory in Beltsville, MD, also receives numerous requests from foreign cooperators as a result of its involvement in the international germplasm exchange program that has been operating for 25 to 30 years. In addition, U.S. breeders request specific germplasm from
foreign sources and new plant introductions are added to the soybean germplasm collections. Coordination of all these exchange activities has been the responsibility of the Plant Introduction Officer in the Germplasm Resources Laboratory in cooperation with U.S. soybean specialists.

During recent years, plant quarantine regulations in specific countries have become more strict and, in many cases, import permits are now required in advance. U.S. breeders are similarly concerned about soybeans entering our country. These facts have resulted in setting up a procedure whereby all experimental plant shipments are consigned through the following address:

Plant Germplasm Quarantine Center
Attn.: H. R. Hanes
USDA, Building 320, BARC-East
Beltsville, MD 20705

Plant inspectors of the Animal and Plant Health Inspection Service (APHIS) examine seed samples, advise whether import permits are required, and finally issue a federal phytosanitary certificate to cover the shipment in accordance with existing regulations for the receiving country. Similarly, shipments coming into the U.S. pass through the Quarantine Center where they are also inspected by APHIS prior to forwarding to the intended recipient or the curators of the soybean germplasm collection, R. L. Bernard and E. E. Hartwig.

Permanent records are kept in the Germplasm Resources Laboratory's files for all shipments passing through the Quarantine Center. Data therein are used for future reference to prevent duplication of shipments, or avoiding subsequent requests being honored until reports on prior shipments have been received. Many cases could be cited where "form" letters have gone to several potential sources of germplasm, thus resulting in useless duplication of effort. Such data is also useful in bringing together specific crop specialists within a given country who may not be aware that their colleagues have already requested or received germplasm from U.S. sources.

Whenever you receive what appears to be a form letter that may have gone to several other agencies in the U.S., you may send it to Beltsville for screening, thus preventing a certain amount of duplication of effort. Some of the most frequently requested material is maintained here at Beltsville and many additional requests are filled by the curators.

All shipments for foreign countries should be addressed to the Quarantine
Center and should include a copy of a letter of transmittal and a listing, in
triplicate, of the samples enclosed. We include one copy inside the package,
another comes to the Germplasm Resources Laboratory from the Quarantine Cen-
ter, and the third is used by the plant inspectors. There is no need to send
an advance copy to Beltsville unless some special conditions warrant advance
approval. Since all exchanges are sent by air, we ask that the maximum weight
be no more than three or four pounds unless some provision is worked out in
advance for charges against the supplying agency.

At present, there is one exception to the above procedures, and this
pertains to the "Iron Curtain" countries. We are required to write a clear-
ance letter, in advance, through the Foreign Agriculture Service, Washington,
DC, to any of these countries: Bulgaria, Czechoslovakia, East Germany, Hun-
gary, Latvia, Lithuania, Poland, Romania, and USSR. Therefore, for these
restricted countries, send a copy of the original request and the seed to:

Plant Introduction Officer
Germplasm Resources Laboratory
Building 001, BARC-West
Beltsville, MD 20705

You may transmit whatever information you wish along with any specific request
for material in exchange. We will then make certain that all such information,
along with your name, will get into the body of the letter. No exchanges are
presently attempted with Albania, Cuba, People's Republic of China, North
Korea, or North Vietnam.

We recognize there are foreign requests directed to the commercial com-
panies the same as to our federal and state researchers. We are willing to
take care of such shipments providing they are not too cumbersome and not
large amounts. One additional qualification we place on handling commercial
materials is whether they would expect to receive, in exchange, foreign vari-
eties or breeding lines that would be of interest to other soybean breeders in
the U.S. Some companies, as well as private breeders, may have a rather
"closed" exchange, whereby they do not wish to share incoming materials. In
these cases, we prefer not to become involved since all germplasm we handle is
to be shared with those breeders who have an interest, and will be assigned
plant introduction (P.I.) numbers. Any requests for foreign germplasm should
be sent to the Plant Introduction Officer. Please include in the request as
much information as possible about any reference to the material or address of
possible sources. Usually, all soybean accessions are sent first to the U.S. Regional Soybean Laboratory, Urbana, IL, or divided with that Laboratory with prior approval of the intended recipient of the seed.

We offer these services on the basis that most soybean breeders have been most cooperative in supplying us, without charge, experimental quantities required in our program of international germplasm exchange. It also permits us to maintain records in a central location covering shipments abroad. We will be glad to answer any inquiries related to these procedures.

H. H. Hyland—USDA

UNIVERSITY OF ILLINOIS
Department of Agronomy
Urbana-Champaign, IL 61801

1) Linkage tests between Sp₁ and Ti seed proteins.*

Polyacrylamide gel electrophoresis has been used to study the Ti and Sp₁ seed proteins of the soybean. The Ti protein has been identified as the Kunitz soybean trypsin inhibitor or SBTI-A₂ (Kunitz, 1945; Rackis et al., 1962; Singh, Wilson and Hadley, 1969). The three forms of SBTI-A₂ designated as Ti₁, Ti² and Ti₃ are electrophoretically distinguishable from one another by their different Rf values of 0.79, 0.75 and 0.83 (Rf = mobility relative to the dye front in a 10% polyacrylamide gel anodic system using a pH 8.3 Tris-glycine buffer) respectively. The forms are controlled by a codominant multiple allelic system at a single locus (Hymowitz and Hadley, 1972; Orf and Hymowitz, 1976b). The Sp₁ protein has not been characterized. The two forms of the Sp₁ protein designated as Sp₁ᵃ and Sp₁ᵇ have Rf values of 0.36 and 0.42 respectively (Orf and Hymowitz, 1976a) and originally were called the "A" and "B" proteins by Larsen (1967). This protein is controlled by codominant alleles at a single locus (Larsen and Caldwell, 1968; Orf and Hymowitz, 1976a). The purpose of this study was to determine if the Ti and Sp₁ proteins were linked

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