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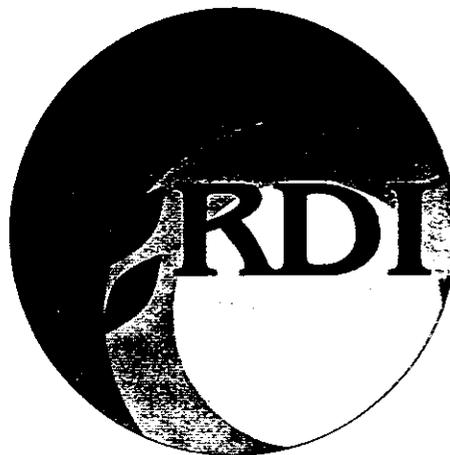
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IMPROVING ACCESS TO NEW AND IMPROVED VEGETABLE VARIETIES



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Reform Design and Implementation Unit

Development Alternatives Inc. Group: Office for Studies & Finance, National Consulting Firm Development Associates, Cargill Technical Services, The Services Group, Training Resources Group, Purdue Universities, University of Maryland

RDI REPORTS

A

Report No. 123

***IMPROVING ACCESS TO
NEW AND IMPROVED
VEGETABLE VARIETIES***

***Reforming Registration for
Varieties of Vegetable Crops***

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September 2000

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James C. Delouche
Cairo
September, 2000

Executive Summary

Background. Obstacles to early and easy access to new varieties of vegetable crops have long been identified as major constraints to developing vegetable production in Egypt, especially for the fresh produce export markets in Europe and in the affluent Middle Eastern countries. Obstacles arise from the requirements for registration of vegetable varieties for use in Egypt and their implementation. Reforming registration for varieties of vegetable crops to provide Egyptian vegetable producers with early and easy access to the newest and best varieties was addressed in the current benchmark D.10.

Recent agreements between the MALR and GTZ in connection with the GTZ-assisted certification project appear to have significantly advanced the reform of vegetable variety registration, although they do not fulfill the terms of the benchmark. The authority of these agreements is not clear, however, since they have not been promulgated in a ministerial decree.

Objectives. The objectives of this consultation were as follows:

1. to clarify specific regulations for registering new vegetable varieties;
2. to propose specific changes in the existing regulations to codify the reforms agreed to in the Memoranda of Agreement between the MALR and GTZ;
3. to propose specific changes in the existing regulations that will fulfill the benchmark agreement;
4. to ensure that the changes are as effective as possible in facilitating the private seed trade; and
5. to build understanding and support for these reforms in the Variety Registration Committee and the agribusiness sector.

Main Issues. The four main issues in the reform of registration for varieties of vegetable crops are listed below:

1. Eliminate the VCU determination as a requirement.
2. Gain acceptance for imported varieties of sufficient evidence of a DUS (Distinct, Uniform and Stable) determination made in a competent country as validation of DUS for registering a vegetable variety for cultivation in Egypt.
3. Attach a one-season to one-year field trial for "adaptability and disease resistance" as a requirement for the acceptance of a DUS determination from a competent country.
4. Adopt a rationale and reasonable definition of "sufficient evidence" in connection with DUS determinations in other countries.

Approach. The approach adopted was concentrated on building understanding and support for the reform among the few key officials and advisors most likely to influence decisions on the reform, and maintaining a hardline position on the reform (i.e., fulfilling the terms and intent of the benchmark). This approach would allow for some negotiation and compromise on final terms while still moving the reform very close to the benchmark. The approach was well reasoned and

sound, but great difficulties were encountered in scheduling visits with key officials and advisors. Thus, implementing the approach did not go as planned.

Accomplishments. Despite being unable to organize meetings with some of the key officials and advisors, many of the objectives were accomplished:

1. The legal basis and status of the existing regulations on variety registration, relevant terminology, situation and practices in other countries are found in the Resource Paper, Part I (Annex D).
2. The amendments and revisions of existing regulations needed to affirm and codify the agreed-to reforms are in Proposal 1 (Annex A).
3. The amendments and revisions of existing regulations needed to achieve the benchmark agreement are in Section 3.1 and in Proposal 2 (Annex A). Fallback or compromise positions are indicated in Section 3.1 and are also in Proposals 3 and 4 (Annex A).
4. The types of evidence that should satisfy the "sufficient evidence" terms for acceptance of DUS determinations from other countries are discussed in The Resource Paper (Annex D), Section 1.2 above, and in Item 3 in the Draft Proposal recommended in Section 3.1.
5. Good understanding of the proposed reforms was achieved with the private seed companies, and a good start was made in improving understanding and support among key officials. The brief prepared on Reasons and Rationale for Reform of the Variety Registration Requirements for Vegetable Crops in Egypt (Annex B) and translated into Arabic was and will continue to be very helpful in building understanding and support. The material prepared for the mini-workshop (Annex E) will also be very useful.
6. A draft Ministerial Decree (Annex C) was developed to reflect the changes suggested above.

Recommendations. The main recommendation is to continue advocacy of the proposed reform prepared and discussed in Section 3.1. Additional recommendations deal with points that should be emphasized in the advocacy, positions that should be maintained and guarded, and options for negotiation.

IMPROVING ACCESS TO NEW AND IMPROVED VEGETABLE VARIETIES

ARE/USAID: APRP BENCHMARK D.10

“D.10: The GOE will simplify its requirements for registering new varieties of vegetable seeds and abolish registration requirements for the import and trade of vegetable seeds already registered or protected in countries belonging to the Organization of Economic Cooperation and Development (OECD).”

1. Background

Obstacles to early and easy access to new varieties of vegetable crops have long been identified as major constraints to developing vegetable production in Egypt, especially for the fresh produce export markets in Europe and in the affluent Middle Eastern countries. Other important constraints such as lack of facilities (e.g., modern packing sheds, chillers at transport terminals and other infrastructure for handling perishables) are well documented. However, a priority for Egyptian farmers is to gain access to high quality varieties for production as soon as their competitors. The obstacles to early and easy access to new vegetable varieties arise in implementing and interpreting two sets of regulations: i) the requirement that varieties of agricultural crops must be registered in Egypt before they can be introduced, produced and planted; and ii) the regulations governing the import of seeds for “scientific purposes or for the development of new varieties.” The variety registration obstacle is addressed in the ARE/USAID benchmark reform D.10. The difficulties in pre-registration import of seeds of new varieties for screening trials are under consideration as a forthcoming benchmark. Both obstacles are addressed in detail in the Resource Paper (Annex D).

1.1 Recent Agreements

Substantial progress has been made toward the long-sought reform of the requirements and process of variety registration for vegetable crops to bring them in line with requirements and practices in most other countries (including some of Egypt’s competitors in the export market for fresh vegetable produce). Progress took place in agreements between the MALR and GTZ in the GTZ-assisted project on seed certification. A major thrust of this project is to secure independence of the agency responsible for variety registration from those concerned in seed production and to develop capabilities in the designated agency to conduct, supervise and use DUS and VCU determinations in the variety registration process. Efforts under the project have naturally focused on variety registration and release of the important field crops (e.g., wheat, rice, faba bean, barley, maize), which are largely developed in Egypt and for which the various classes of certified seeds are produced and marketed. Some attention, however, was given to vegetable varieties, which are mostly imported along with the seeds. The Memorandum of Agreement of the Egyptian-German Executive Committee for Seed Sector of 21/02/1999 agreed that,

“For imported (vegetable) varieties registered in OECD member countries (except strategic crops) no registration is required. On the other hand, VCU tests of one-year

duration have to be carried out in order to determine the suitability of the variety for Egypt and its resistance to pests and diseases."

This agreement represents two steps forward and one and one-half back. The ambiguity of these actions was apparently recognized, because the subject was revisited in the Mid-Term Plan for Variety Evaluation, Registration, and Plant Breeder's Rights. The agreement on variety registration for vegetable crops was clarified and extended by MALR and GTZ in October, 1999 as follows:

"DUS for vegetables and fruits will be done only for new varieties that are bred in Egypt as was agreed already. For OECD registered vegetable varieties no new DUS will be done in Egypt. Instead, DUS data from the respective OECD country must be submitted upon registration and only a one-season resistance to pests and adaptation tests are carried out."

This agreement, while an improvement, is still ambiguous and contains a major pitfall. The ambiguity is that a one-season test for resistance and adaptability is part of VCU determinations. The pitfall is the requirement that DUS data from an OECD country must be submitted upon registration. Simple and direct evidence of DUS (e.g., a plant protection certificate) should be adequate. DUS essentially determines a variety's genetic uniqueness and integrity (i.e., whether a claim that a plant population meets the DUS criteria is valid). If this determination is competently made in another country, it need not be repeated in Egypt or any other country. The field data from DUS determination might be important if seeds of the variety were to be produced and certified in Egypt. The seeds, however, are imported. Unless direct, simple evidence of the DUS of a variety is considered adequate, there could be no end to the demands for DUS data. Furthermore, DUS field-test type of data would not be available for U.S. varieties that are important to Egypt, because the U.S. does not require formal registration of plant varieties. A DUS determination for variety protection, which is required, seldom involves field testing: the determination is made by comparing the description of the applicant variety in a database containing descriptions of existing varieties. The recent requirement in Ministerial Decree No. 702 of 1999 of "fingerprints" of varieties—field crops and vegetables—as part of the application for registration illustrates the use of inappropriate regulations to gain revenues and/or to thwart reforms.

The MALR/GTZ Agreement on reform of variety registration for vegetable crops is further clarified in a subsection of the Mid-Term Plan:

"It is also agreed that the VCU trials are only performed for field crops and not for horticultural crops.....Instead, in Horticultural Crops only a 1-season resistance to pests and adaptation tests are carried out. VRC (Variety Registration Committee) will decide the responsible institution for the test."

Despite the ambiguities and uncertainties, these agreements have been implemented in at least two instances. One was for a tomato variety developed by Norvatis (DUS determination in the

Netherlands) with a one-season field test. The other case was, surprisingly, for a canola variety developed by Cargill (DUS determination in France) with one year of field testing. Canola is an oil-seed field crop.

1.2 Main Issues

The main issues in reform of variety registration for vegetable crops are outlined below:

- VCU determination. The VCU determination needs to be eliminated in all its forms, since it is expensive and difficult—if not impossible—to carry out. More importantly, the international consensus is that VCU is totally inappropriate for vegetable varieties that have value for many complex and qualitative traits (e.g., color, shape, taste, texture, etc.) desired by the market (i.e., consumers). The VCU determination was either never applied or has been long dropped in the developed countries and, more recently, in most of the developing countries.
- DUS determinations in other countries. For imported varieties, sufficient evidence of a DUS determination in countries that have capabilities for making the determination and follow internationally recognized protocols (e.g., OECD or UPOV) should be accepted as validation of DUS for the purpose of their registration in Egypt. Essentially all new vegetable varieties are developed by four or five groups of international vegetable seed companies and thus are imported into Egypt and to other vegetable producers along with the seeds. DUS determines the genetic identity of a variety; it is not concerned with the value or merit of a variety. DUS determination is necessary only once.
- Additional requirements. The last-bastion position in reforming registration for vegetable varieties will be *a one-season field planting for evaluation of disease resistance and adaptability*. Even the more liberal of the influential officials and advisors holds this position, a sort of back-door VCU. This position will be exceedingly difficult to dislodge.
- Sufficient evidence of DUS determination for imported varieties. The evidence required for acceptance of a DUS determination in a country that adheres to international protocols of OECD and/or UPOV should be simple, direct and obvious. The evidence could be a variety protection certificate; a variety registration certificate; a listing in a National List of Varieties in a country that requires variety registration; notification of registration and publication of a summary description in a scientific journal; a statement from a designated authority or seed control official that a variety has legal status in the country and is in use; recommendation of the variety in an extension publication from the country where it was developed, etc. If the definition of sufficient evidence encompasses field test data, "fingerprints," certificates affixed with embassy stamps, etc., the purpose of the reforms will be subverted or circumvented.
- Local varieties and those without evidence of DUS. Presently, these sorts of varieties have to be tested for maybe three years for both VCU and DUS. If VCU is eliminated for vegetables, the time period should be reduced to that appropriate for the DUS determination. Tests performed in two seasons requiring that the registration process be completed within

one year is reasonable and consistent with the requirements in other countries that have only one season per year.

- Registration and testing fees. The loss of testing fees due to reforming variety testing is undoubtedly an important factor in the opposition to reform. The fees are a major source of discretionary funds for the research units involved. "Reform" of the registration fee schedule through negotiation between ARC/HRI and the vegetable seed companies to maintain fees at about their present level might soften some of the important sources of opposition to this reform.

2. Terms of Reference

The goal of the consultation was to assist RDI and the GOE in achieving the benchmark as measured by the official indicators. The goal was to be achieved through the following objectives:

1. Clarify specific regulations for registering new vegetable varieties.
2. Propose specific changes in the existing regulations to codify the reforms agreed to in the Memorandum of Agreement between the MALR and GTZ.
3. Propose specific changes in the existing regulations that will fulfill the benchmark agreement.
4. Ensure that the changes are as effective as possible in facilitating the private seed trade. (Explore alternative methods for presenting and obtaining DUS data, such as company data, independent lab data, physical samples, etc.)
5. Build understanding and support for the reforms in the Variety Registration Committee and the agribusiness sector.

The APRP-RDI team consisted of Lawrence Kent, APRP-RDI lead, Dr. M. Z. Gooma, APRP-RDI, Dr. Amin Kh. Okasha, retired head of ARC's HRI, Consultant, and Dr. James C. "Curt" Delouche, Seed Industry Consultant.

3. Recommendations

The main recommendation is to continue advocacy of the draft proposal for reforming the requirements and the process of variety registration for vegetable crops that is set forth in the next section. Additional recommendations and suggestions are presented in Section 3.2.

3.1 Proposed Reform

The draft reform proposal that seems best suited to the situation is presented below.

Draft Proposal: Registration of Vegetable Varieties

Over the past decade, Egypt's agricultural policies have achieved remarkable successes in increasing the acreage, productivity and export of vegetable crops. However, rapid changes in consumer preferences and in variety development, as well as keen competition in the world fresh produce market, make it imperative that the Egyptian variety registration system for vegetable crops be reformed to cope with these changes. The reform would provide Egyptian farmers with early and easy access to the new high quality varieties and would enhance their competitiveness in the world fresh produce market.

In view of the foregoing, Ministerial Decree No. 82 of 1998 is amended to revise the requirements and provisions for registration of vegetable varieties and to establish new provisions to bring them in line with internationally accepted views and practices.

1. The VCU determination is eliminated for registration of vegetable varieties.
2. The provisions in Ministerial Decree No. 82 of 1998 relating to other specific qualifying and technical requirements for registration of vegetable varieties should be canceled and replaced with the following provisions:
 - i. For imported varieties, sufficient evidence of their registration, protection or legal status as a variety in conformity with internationally accepted protocols (e.g., OECD or UPOV) shall be considered as fully satisfying the requirements for their registration and cultivation in Egypt. Varieties that qualify for registration under this provision shall be forthrightly registered and entered into the List of Registered Vegetable Varieties. No additional requirements shall be imposed for their registration and planting in the country.
 - ii. The DUS determination test shall be required for registration of new vegetable varieties developed in Egypt and imported varieties without evidence of DUS. The determination shall be in accord with the general procedures prescribed in Ministerial Decree No. 82 of 1998 for field crops but should be based on field tests in not more than two growing seasons. The total period required for registration shall not exceed one year from date of application to notifying the applicant of the decision on the application. The field tests shall be made by a competent agency assigned by the Variety Registration Committee either (1) on its own premises, (2) in cooperation with the applicant for registration in a rented field, or (3) by a neutral third party.
 - iii. The testing and registration fees specified in Ministerial Decree No. 82 of 1998 shall be adopted and applicable in all cases.
 - iv. The registration of a protected variety or of a protected or unprotected hybrid shall be in the name of the variety's originator. All seed handling and marketing rights shall be reserved only for the originator and his authorized agents.
 - v. The registration of a non-protected, open-pollinated vegetable variety for use in Egypt

shall be considered general and not applicant specific. Any licensed seed company or trader shall have the right to produce or import and market seeds of the variety after its registration, provided other requirements for seed production and marketing are met.

3. The terms "sufficient evidence of their registration, protection or legal status as a variety in conformity with internationally accepted protocols such as those of OECD or UPOV" in 2, i) are defined for the purpose stated as: a true copy of a Plant Variety Protection Certificate issued by the designated authority in a UPOV-member country; a true copy of a registration certificate for the applicant variety issued by the designated authority in an OECD country or in a country with equivalent variety registration protocols; the listing of the applicant variety in the National List of Varieties - Vegetable Section in an OECD country or in a country with equivalent variety registration protocols; the listing of the applicant variety in the EU Common Catalogue of Vegetable Varieties; publication of the description of the applicant variety in a scientific or professional journal such as *Crop Science*, *HortScience*, *Journal American Society for Horticultural Science*; documentation showing that the applicant variety is legally accepted as a variety for marketing and planting of seeds in an OECD country (e.g., description of the variety in a trade magazine; the recommendation (listing) of the variety in an extension publication for vegetable producers in the country of origin along with a letter from the designated authority (e.g., seed control official) in the country of origin certifying that the variety meets the definition of a variety and is approved for planting); the listing of the variety in the variety database of the web-site of an official Plant Variety Protection Agency (i.e., U.S. Plant Variety Protection of the U.S. Department of Agriculture, www.ams.usda.gov/science/pvp.htm).
4. A description of the variety in the accepted UPOV format and a sample of seeds in the quantities prescribed in Section IV, items 2 and 5 of Ministerial Decree No. 82 of 1998 and in accord with provisions of Ministerial Decree No. 103 of 1996 shall be part of the evidence for validation of a DUS determination in a qualifying country. There shall be no additional requirements related to the evidence for the DUS determination of a variety.
5. Provisions in other Ministerial Decrees that contravene these provisions and their intent are herewith cancelled.
6. The other provisions in Ministerial Decree No. 82 of 1998 relating to procedures, fees, and other administrative and procedural aspects of variety registration shall remain in force.

Fallback positions and compromises. The main fallback positions or compromises should be in connection with item 2, i) above. The first fallback position would provide for registration and entry into the Register of Vegetable Varieties *within one growing season for the applicant crop*, rather than "forthrightly". The second position would extend compromise to *within one growing season for the applicant crop plus 2 months*. This should provide time for one season's observations, which is probably the last-bastion position, without specifically requiring or mentioning it.

3.2 Other Recommendations

In continuing the advocacy for reform, the following points should be emphasized:

- The reforms are restricted to vegetable crops, which differ vastly from field crops in terms of production, producers and markets. The reform is not a first step to abolish variety registration for all crops. The DUS and VCU determinations are still needed and used for field crops in many developed as well as developing countries. Most other countries, however, recognize the differences between field and vegetable crops and have long since adopted the reforms now sought in Egypt for vegetable crop varieties.
- Registration of vegetable varieties would not be abolished but would continue to be required to provide for other controls as needed. The requirements would, however, be modernized to bring them in line with those of most other countries, including Egypt's competitors in fresh vegetable produce production.
- Egyptian vegetable producers need early and easy access to the newest and best vegetable varieties to remain competitive and to gain markets and market share for fresh vegetable produce.
- The requirements for registering vegetable crop varieties in Egypt are decidedly outmoded. These obsolete requirements and procedures work against Egypt's interests and aims. Given its great assets of fertile soil, ample water, exceptional climate, and good farmers, Egypt could become the dominant vegetable producer in the region.
- Fees are important but should not determine policy reforms. Maintaining most of the fees even with the reforms can probably be negotiated with the vegetable seed companies. This would require an increase in the registration fees to compensate for lost testing fees.
- Continue to concentrate advocacy efforts on the key officials and advisors who will influence decisions on the reforms.
- Maintain a firm position for direct and obvious evidence of DUS determination in another country, such as a plant protection certificate. Do not accept embassy-notarized documentation, field test results, etc. The direct evidence of DUS plus a variety description in UPOV format or its equivalent already required in Ministerial Decree No. 82 as part of the application should be sufficient. Otherwise the reforms will be subverted and little will be gained.
- If it becomes necessary to fall back from the benchmark position—as is likely—adopt the first or second compromises suggested above.

ANNEX A

DRAFT PROPOSALS FOR REFORM OF VEGETABLE VARIETY REGISTRATION

Proposal 1 (06/09/00)

1. Amend Ministerial Decrees No. 1065 of 1995 and No. 82 of 1998 and any other decrees defining the crop species subject to the variety registration requirements set forth in Articles 10 - 15, Law of Agriculture issued in Law No. 53 of 1966 to restrict the full force and intent of Articles 10 - 15 to the field crops specified and to potato, and to subject the other vegetable species listed to special requirements as determined and decreed by the Minister.
2. Amend Ministerial Decree No. 82 of 1998, Section II, Variety Testing, to eliminate the VCU test for all vegetable crop varieties except potato. (Note: DUS determination would be retained.) Further, amend Ministerial Decree No. 82 to replace all statements and provisions relating to the specific requirements for registration of vegetable varieties except those of potato with the following provisions:
 - i. The DUS determination shall be made only on new varieties of the vegetable crops specified (Note: crops specified in Ministerial Decree No. 1064 of 1995 and in the Annex to Ministerial Decree No. 82 of 1998) that are developed in Egypt and varieties of foreign origin without evidence of DUS. In both cases the DUS determination shall be made in accord with the protocols and general procedures prescribed herein (i.e., in Ministerial Decree No. 82) for field crops and potato.
 - ii. For imported varieties originating in OECD countries, satisfactory evidence of their registration, protection or legal status as a variety in the country of origin shall be considered as validation of DUS for registration purposes in Egypt. In some instances the registration process may include observations of the variety in one or more field plantings for one or two seasons. This process should not exceed a period of one year from the application date to notifying the applicant of the decision on the application (and entry of the variety into the Register of Vegetable Varieties if registration is approved). When required, the observation planting(s) shall be made by the competent agency assigned by the Variety Registration Committee either (1) on its own premises, (2) in cooperation with the applicant in a demonstration plot or vegetable grower's field, or (3) in cooperation with an independent third party (e.g., an agricultural university).
 - iii. In all cases the testing and registration fees set forth in Ministerial Decree No. 82 of 1998 shall be adopted and applicable.
 - iv. The registration of a non-protected, open-pollinated vegetable variety for use in Egypt shall be general and not applicant specific. Any legitimate seed company or trader shall have the right to produce or import and market seeds of the variety after its registration, provided other requirements for seed production are met.

- v. The registration of a protected variety or of a hybrid, protected or unprotected, shall be in the applicant's name. All privileges attached thereto shall be reserved to the applicant and/or his authorized agent(s).

Proposal 2 (13/09/00)

Proposal 2 took a hard-line position that would fully satisfy the intent of benchmark D.10. The differences from Proposal 1 are underlined.

Over the past decade, Egypt's agricultural policies have achieved remarkable successes in increasing the acreage, productivity and export of vegetable crops. However, rapid changes in consumer preferences and in variety development, as well as severe competition in the world fresh produce market, make it imperative that Egypt reform its variety registration system for vegetable crops to cope with these changes. These reforms will provide Egyptian farmers with early and easy access to the new, high quality varieties. Egypt's competitiveness in the world fresh produce market would certainly be enhanced. Reforms in the variety registration system are particularly justifiable in view of the operative requirements and procedures being the same for vegetable and field crops, which are vastly different in many significant ways.

In view of the foregoing, the Ministerial Decree No. 82 of 1998 should be amended to eliminate the VCU test for registration of vegetable varieties in line with internationally accepted views and practices. Further amendment is needed to replace all other provisions relating to the specific requirements for registration of vegetable varieties with the following provisions:

Note: Potato is now included rather than excluded from "vegetable varieties;" positions of items i) and ii) and iv) and v) were reversed from Proposal 1; changes from the preceding are underlined.

- i) For imported varieties, sufficient evidence of their registration, protection or legal status as a variety in conformity with internationally accepted protocols (e.g., OECD or UPOV) shall be considered as fully satisfying the requirements for their registration and cultivation in Egypt. Varieties that qualify for registration under this provision shall be registered and entered into the List of Registered Vegetable Varieties within a period that does not exceed three (3) months from the date of application.

- ii) The DUS determination test shall be required for new vegetable varieties developed in Egypt and for imported varieties without evidence of DUS. The determination shall be in accord with the general procedures prescribed herein (Ministerial Decree No. 82 of 1998) for field crops but based on only one year of field testing. The total period required for registration shall not exceed one year from the application date to notification of the applicant of the decision on the application. The field tests shall be made by a competent agency assigned by the

Variety Registration Committee either (1) on its own premises, (2) in cooperation with the applicant for registration in a rented field, or (3) by a neutral third party.

- iii) In all cases the testing and registration fees specified in Ministerial Decree No. 82 of 1998 shall be adopted and applicable.
- iv) The registration of a protected variety or hybrid, protected or unprotected, shall be in the name of the originator of the variety and his authorized agent, and all seed handling and marketing rights shall be reserved only to them.
- v) The registration of a non-protected, open-pollinated vegetable variety for use in Egypt shall be considered general and not applicant specific. Any licensed seed company or trader shall have the right to produce or import and market seeds of the variety after its registration, provided other requirements for seed production and marketing are met.

Proposal 3 (13/09/00)

Proposal 3 was essentially identical to Proposal 2 except for two significant changes pencilled in by Salah Wanis. These are as follows:

The last line in item i) was changed from, "three (3) months" to, "within a period not to exceed the length of one growing season for the applicant crop".

The 4th line in item ii) was changed from... "based on only one year of field testing....." to "based on field tests in not more than two growing seasons for the applicant crop."

In line 2 of item iv) "and his authorized agent" was deleted and in line 3 the last word "them" was replaced with "the originator and his authorized agent(s)."

Proposal 4 (17/09/00)

Only item i) was changed as follows:

- i) In the last line of item i) the words, "plus two months." were added to the end of the sentence as amended for Proposal 3.

ANNEX B

REASONS AND RATIONALE FOR REFORM OF VARIETY REGISTRATION REQUIREMENTS FOR VEGETABLE CROPS IN EGYPT

ARE/USAID Benchmark Reform

"D.10. The GOE will simplify its requirements for registering new varieties of vegetable seeds and abolish registration requirements for the import and trade of vegetable seeds already registered or protected in countries belonging to the Organization for Economic Cooperation and Development (OECD)."

1. Variety registration requirements delay and frequently prevent the introduction of new, high-quality vegetable varieties for use by Egyptian vegetable growers. The period of use for modern, high-quality vegetable varieties (especially hybrid varieties) has steadily decreased so that some new varieties become obsolete before the registration process is completed.
2. Vegetable producers require early access to the newest and best varieties of vegetables to maintain Egypt's present position as a producer and exporter of quality vegetables. Early access is critical to achieve GOE/MALR's development plans for vegetable production.
3. The present variety registration requirements contained in provisions of Agriculture Law No. 53 of 1966 are antiquated and inappropriate, especially for vegetable crops, and are generally regressive.
 - i. The requirements are the same for field and vegetable crops. No recognition is made of the great differences between field and vegetable crops in terms of level of development, sources of improved varieties, sources of seeds, types and market orientation of growers, and the risks associated with the use of new varieties.
 - ii. The requirements do not take into account the global restructuring of vegetable crop improvement and seed production into four or five groups of specialized and integrated international companies. These companies breed and develop high quality vegetable varieties (many of which are hybrid varieties); produce vegetable seeds in environmentally optimum locations, and distributes them worldwide through subsidiaries and agents.
4. Smuggling of seeds and misrepresentation of varieties are common in vegetable production in Egypt. These undesirable and illegal practices are among the important consequences of the obstacles imposed by current variety registration requirements on the early and easy access of vegetable producers to new, high quality vegetable varieties. By retaining obsolete regulations on the introduction of new varieties, the GOE provides incentives for smuggling of seeds and misrepresentation of varieties. Thus, GOE essentially forfeits any control over the substantial portion of vegetable seeds involved in illegal activities.

5. The VCU determination for variety registration of vegetable crops was either never required or was abolished long ago in the developed countries and, more recently, in most developing countries. The worldwide view is that VCU determinations for vegetable varieties are meaningless and their value is best established in the market.
6. The purpose of the DUS determination is to establish the identity of a variety for registration, protection or other legal requirement. DUS is not concerned with a variety's merits or value.
7. The internationally accepted view is that the DUS determination needs to be made only once. A valid determination of DUS in one country should be accepted in other countries.
8. **Risks.** The risks associated with adopting and implementing the proposed reforms in variety registration requirements for vegetable crops are negligible.
 - i. Only the best and most progressive vegetable growers change to a new variety, usually only for a portion of their crop and after observing the new variety in demonstrations or upon being reliably informed about its qualities.
 - ii. The progressive growers who take on new varieties (i.e., the early adopters) do not save seeds for planting or spread seeds to neighboring growers.
 - iii. If a new variety does not perform satisfactorily in terms of productivity or marketability, the grower will return to the previous variety planted or to some other variety of known performance. The only possible damage is to the early-adopter grower and to the reputation of the seed company or supplier. No danger of damage exists to the country's food supply or security.
 - iv. Small, poor, uneducated farmers (i.e., home gardeners) who grow vegetable crops for their own consumption or for the local market plant traditional, well known and established varieties. They do not seek or plant the newest varieties.
9. **Benefits.** Compared to the minimal risks associated with a new variety, the potential benefits from the early and easy adoption of new varieties can be very great to the early-adopter growers and for commercial vegetable production in Egypt:
 - i. Egypt's market position in vegetable production can be maintained;
 - ii. Prompt and full advantage can be taken of opportunities to increase market share and/or enter new markets for vegetable products; and

- iii. Competitors will not have the advantage of earlier and easier access to new, high quality vegetable varieties.

NOTE: DUS means Distinct, Uniform and Stable, the technical criteria for a cultivated variety; VCU means Value for Cultivation and Use (e.g., yield, and maturity).

ANNEX C

MINISTERIAL DECREE No. _____ of 2000

**Deputy Prime Minister
and Minister of Agriculture and Land Reclamation,**

Pursuant to the Law of Agriculture issued under Law No. 53 of 1966, Chapter 2, Articles 10 - 15 that require the registration of varieties of specified agricultural crops, and

Considering

That the variety registration system for vegetable crops needs to be updated and modernized to take into account the worldwide changes in vegetable crop improvement and seed production and to provide Egyptian vegetable farmers with early and easy access to new high quality vegetable varieties to enhance their competitiveness in the world fresh produce market, and

Reviewing

Ministerial Decree No. 91 of 1967 relating to seed importations and exportations,
Ministerial Decree No. 1064 of 1995 for the names of crops for which variety registration is required,

Ministerial Decree No. 103 of 1996 for variety registration regulations,

Ministerial Decree No. 540 of 1996 for re-establishment of the Variety Registration Committee,

Ministerial Decree No. 867 of 1997 for marketing of agricultural crop varieties,

Ministerial Decree No. 82 of 1998 establishing crop variety registration protocols and guidelines,

Ministerial Decree No. 368 of 1998 for testing seeds, and according to the Memorandum presented by the President of ARC and Chairman of the Crop Variety Registration Committee

Has Decreed

Article 1

Ministerial Decree No. 82 of 1998 is amended in these respects:

1. The VCU determination for registration of vegetable varieties is eliminated;
2. All provisions relating to the specific technical requirements for registration of vegetable varieties are nullified;
3. Registration of vegetable varieties shall henceforth be in accord with these provisions:
 - i) For imported varieties, sufficient evidence of their registration, protection or legal status as a variety in conformity with internationally accepted protocols such as those of OECD or UPOV shall be considered as fully satisfying the requirements for their registration and cultivation in Egypt. Varieties that qualify for

registration under this provision shall be forthrightly registered and entered into the List of Registered Vegetable Varieties.

- ii) The DUS determination test shall be required for new vegetable varieties developed in Egypt and for imported varieties without evidence of DUS. The determination shall be in accord with the general procedures prescribed herein (Ministerial Decree No. 82 of 1998) for field crops but based on field tests in not more than two growing seasons. The total period required for registration shall not exceed one year from application date to notification of the decision on the application. The field tests shall be made by a competent agency assigned by the Variety Registration Committee either (1) on its own premises, (2) in cooperation with the applicant for registration in a field he owns or rents, or (3) in cooperation with a neutral third party.
- iii) In all cases the testing and registration fees specified in Ministerial Decree No. 82 of 1998 shall be adopted and applicable.
- iv) The registration of a protected variety or of a hybrid (protected or unprotected) shall be in the name of the originator of the variety. All seed handling and marketing rights shall be reserved only for the originator and his authorized agents.
- v) The registration of a non-protected, open-pollinated vegetable variety for use in Egypt shall be considered general and not applicant specific. Any licensed seed company or trader shall have the right to produce or import and market seeds of the variety after its registration, provided that other requirements for seed production and marketing are met.

4. The terms "sufficient evidence of their registration, protection or legal status as a variety in conformity with internationally accepted protocols such as those of OECD or UPOV" in 3, i) are defined for the purpose stated as: a certified true copy of a Plant Variety Protection Certificate issued by the designated authority in a member country of UPOV; a certified true copy of a registration certificate for the applicant variety issued by the designated authority in an OECD country; the listing of the applicant variety in the National List of Varieties - Vegetable Section in an OECD country; the listing of the applicant variety in the EU Common Catalogue of Vegetable Varieties; publication of the description of the applicant variety in a scientific or professional journal such as *Crop Science*, *HortScience*, *Journal American Society for Horticultural Science*; documentation showing that the applicant variety is legally accepted as a variety for marketing and planting of seeds in an OECD country (e.g., description of the variety in a trade magazine; the recommendation (listing) of the variety in an extension publication for vegetable producers in the country of origin and a letter from the designated authority (e.g., seed control official) in the country of origin certifying that the variety meets the definition of a variety and is approved for planting; the listing of the variety in the variety database of the web-site of an official Plant Variety Protection Agency (i.e., the U.S. Plant Variety Protection of the U.S. Department of Agriculture, www.ams.usda.gov/science/pvp.htm).

5. A description of the variety in the accepted UPOV format and a sample of seeds in the quantities as prescribed in Section IV, items 2 and 5, of Ministerial Decree No. 82 of 1998 and in accord with provisions of Ministerial Decree No. 103 of 1996 shall be part of the evidence for validation of a DUS determination in a qualifying country. There shall be no additional requirements related to the evidence for the DUS determination of a variety.
6. The relevant administrative process for variety registration, including application procedures and dates, and the schedule of testing and registration fees as prescribed in Ministerial Decree No. 82 of 1998 for registration of field and vegetable crop varieties shall remain in force.
7. Provisions in other Ministerial Decrees that contravene these provisions and their intent are herewith canceled.

ANNEX D

RESOURCE PAPER

I. IMPROVING ACCESS TO NEW AND IMPROVED VEGETABLE VARIETIES

ARE/USAID: APRP BENCHMARK D.10

“D.10: The GOE will simplify its requirements for registering new varieties of vegetable seeds and abolish registration requirements for the import and trade of vegetable seeds already registered or protected in countries belonging to the Organization of Economic Cooperation and Development (OECD).”

1. Background

The D.10 Benchmark on registration of vegetable crop varieties was adopted in response to many complaints and informed observations that the present process and requirements for registering varieties of vegetable crops in Egypt, especially imported varieties,

“represents a bottleneck in the development of the horticultural subsector, because it causes delays in the distribution to farmers of the latest varieties of vegetable seeds. Companies that import or develop new varieties must seek and obtain registration from the GOE before they can market these seeds in Egypt. Registration is not granted until complicated and time-consuming tests are completed, sometimes causing multi-year delays before farmers can gain access to the best seed varieties. Expert analysts... have found that much of this testing is unnecessary and not worth the costs and delays it creates in getting the best seeds to farmers. Timeliness is particularly important in export agriculture, because buyers in foreign markets often are seeking specific horticultural produce grown from the latest varieties of seeds.”

The consequences of the variety registration impediments to the timely and orderly introduction of new and improved vegetable varieties cannot be overstated. The business and customer service arrangements of vegetable seed companies are seriously disrupted. The flow of benefits from new and improved vegetable varieties to vegetable growers, exporters, and consumers is delayed, diminished because of the delays, and frequently forsaken entirely because obstacles in the registration process are insurmountable or the period required for its completion exceeds the life of the candidate variety.

Studies and reports on seed sector reforms since the early 1990s have repeatedly highlighted the critical importance of reform of the variety registration process and requirements for vegetable crops to the vegetable producers, consumers and seed suppliers (companies), for achieving development goals in processing and export of vegetable products and for increasing investments and technology transfer in the horticultural crops subsector. Significant reforms have been made in the requirements and fee structure for vegetable crop variety registration, but they have not

been implemented in an efficient and consistent manner and have not kept pace with the rapid and profound changes in the vegetable seed industry.

During the 3rd Egyptian National Seed Conference, 10-12 May 1999, the International Vegetable Seed Companies and their representatives in Egypt presented a brief on "Easing Barriers to Expanded Foreign Investment and Technology Transfer to the Vegetable and Ornamental Seed Market in Egypt." The brief summarizes very well the opportunities in the horticultural sector, the reforms needed in the process and requirements for registration of vegetable crop varieties, and the expected benefits. It begins by emphasizing the tremendous technical and organizational changes in the global seed industry during the past five years or so with more greatly added values in new vegetable varieties and high prospects for even greater advances in the next five or so years. Recent reforms in variety registration were recognized and appreciation was expressed to the GOE, especially the MALR. Consideration of the following additional reforms was requested:

- Drop the VCU determination for vegetable varieties.
- Reduce the DUS determination to one year of testing.
- Accept for automatic registration in Egypt any vegetable variety that has already been registered or protected in an OECD country since that constitutes proof that the variety has successfully met all DUS requirements.
- Permit seed companies to import adequate seed samples for private pre-registration trials of new vegetable varieties under local conditions.
- Testing fees when applicable should be paid upon application, while registration fees should be paid upon registration.

The brief ends with a listing of the benefits to the Egyptian agricultural economy from adoption and implementation of the variety registration reforms requested for vegetable crops:

- Dramatic increases in the production of high quality vegetables
- New and increased opportunities for the export of high-value vegetables adapted to European and other profitable markets
- Increased foreign investment in the vegetable seed industry in Egypt, which could make it the leading center for vegetable seed development, production and marketing in the Middle East and Africa
- Early and full access to the latest technologies for vegetable seed adaptation, production, packaging, and marketing

2. Justification and Rationale for Reform of Variety Registration for Vegetable Crops

Importing seeds of new and improved varieties of vegetable crops for planting is the most critical and important technology transfer activity for development of the horticultural subsector in terms of both enhanced consumables for the domestic market and high quality produce for export. The transfer of this vital technology to vegetable producers, however, is severely impeded by variety registration requirements and processes that are antiquated, inappropriate, unnecessary and out of step with reforms and trends in other countries that are competitors or markets for Egyptian horticultural produce. Eliminating the variety registration impediment is an urgent matter for

maintaining the horticultural subsector's present position and vital for its envisaged development.

While the justification and rationale for reforming the registration process and requirements for vegetable crop varieties in the foregoing sections should be sufficient, they can be strengthened by additional explanations of the following:

- why the process and requirements for registering vegetable crop varieties are antiquated, inappropriate, and detrimental to development of the horticultural subsector,
- why the vegetable seed segment of the seed industry is viewed and regulated differently than the field crops segment in most countries and should also be in Egypt, and
- why the risks of variety registration reform or even dropping the registration requirement for vegetable crops are insignificant compared to the potential benefits.

2.1 Obsolete Requirements for Vegetable Crop Variety Registration

The requirements for registration of vegetable crop varieties have remained essentially unchanged since they were established in Agriculture Law No. 53 of 1966. Since 1966, plant breeding, variety development and the seed industry have greatly changed (and have totally changed in the vegetable seed segment of the industry). Variety improvement and development shifted from open-pollinated types to high-yield, high-quality varieties and hybrids and from the public sector institutes to private companies. Globally, variety improvement for vegetable crops is now almost totally in the hands of four or five groups of highly specialized and integrated companies that create new varieties, establish their cultural requirements, produce seeds in environmentally favored locations and distribute them in the various countries through subsidiaries, branches, trade partners and agents. Commercial vegetable producers in all countries are very dependent on these groups of companies for improvements in vegetable crop varieties and seeds for planting. Public sector research institutions have not played a significant role in vegetable crop breeding and improvement for at least the last two decades. The developed and progressive developing countries have responded to these profound changes in variety improvement and seed supply for vegetables by eliminating impediments to the introduction of new varieties and the importation of seeds.

During the past 10-15 years, variety improvement has greatly accelerated in response to technological advances and profound and frequent changes in consumer preferences, markets and competition. Undoubtedly these changes will continue, probably at an even faster rate, as varieties with better quality and special qualities such as the so-called nutraceuticals (e.g., varieties with specific and very desirable nutritive—even medicinal—properties) enter the market in the next few years. Vegetable variety registration in Egypt is totally out of phase with the changes, trends, needs and opportunities in commercial vegetable production. Current registration practices constitute a serious impediment to the orderly and timely introduction of the new, improved vegetable varieties critical for developing the horticultural subsector and enhancing its competitiveness. The seriousness of this situation increases every year.

2.2 Differences Between the Vegetable and Field Crop Segments of the Seed Industry

The developed countries have long recognized that the vegetable and field crop seed segments of

the seed industry or seed supply system differ in many technical and socio-economic aspects and have designed their seed regulatory controls to take the differences into account. Most developing countries have also come to recognize that the two segments of the seed supply system are very different and have made appropriate changes in seed-related regulations and attitudes. Some of the most significant differences between the two segments of the seed supply system in developing countries follow:

- Essentially all of the improved varieties of the commercially important vegetable crops are developed out of country by large international companies that specialize in vegetable crop breeding, variety improvement and seed supply. On the other hand, most of the varieties of self-pollinated field crops (e.g., wheat and rice) and a dominant share of the hybrid varieties of maize, sorghum and other crops are developed in country by public (government) research institutes (e.g., ARC institutes).
- Vegetable varieties, especially the hybrid varieties, are increasingly short-lived (i.e., their period of use is only 3 - 5 years). Field crop varieties remain in use for relatively long periods: 6-10 years and longer.
- Vegetable growers usually purchase rather than save seeds needed for planting, which is the dominant practice for field crop farmers (cotton is an exception). There are several reasons for this difference. First, most vegetable crops are produced for products other than the matured seed, such as wheat grain, so that seed saving is inconvenient, complex, and requires special efforts. Secondly, the quality of the produce, which is critical in commercial vegetable production, is more closely associated with variety than is the case for field crops (except cotton), where the variety is most closely associated with the quantity of produce (yield) or maturity period. Thus, purchasing seeds of an improved variety of a vegetable crop from a reliable source is the best way to assure the produce qualities important in the market.
- The production of high quality vegetable seed (especially of hybrid varieties) is technically complex and requires rigorous supervision, special climatic/environmental conditions, and specialized labor. To meet the increasingly demanding conditions for vegetable seed production, the vegetable seed industry was progressively organized on a global basis during the latter half of the century. Presently, vegetable seeds are produced in locations around the world where the production requirements for high quality seeds can best be met, with the result that most of the seeds of improved vegetable varieties must be imported even in the developed countries. In contrast, the seeds for most varieties of field crops including hybrid varieties are produced in country, usually in the region they are to be used.
- Vegetable seeds are required in relatively small amounts (e.g., grams), even by commercial growers, while field crop farmers require multiple kilos of seeds.

- The value and performance of vegetable varieties are determined by some objective and many subjective factors (e.g., maturity, taste, appearance, size, shape, color and uniformity of produce, shipping quality and shelf-life, disease resistance, yield, etc.). However, the value and performance of field crop varieties are primarily determined by yield, maturity and pest resistance.

Considering the many important differences between the vegetable and field crop segments of the seed industry or seed supply system, it is evident that the two segments need to be regulated in very different ways and to different degrees.

2.3 Risks and Benefits

The crop variety registration requirement was introduced into the regulatory framework for seed supply systems to eliminate or at least reduce the risks to farmers and agriculture from the use of unknown and unsuitable crop varieties. Its two main functions are a) to ensure that a seed variety offered in the market is distinct from other known and recognized varieties of the species, reasonably uniform and stable in its relevant characteristics (i.e., that it is an authentic variety; DUS determination); and b) to ensure that the variety is adapted to the conditions under which it will be grown and suitable for cultivation (i.e., VCU determination). The two functions of variety registration are still viewed as necessary for the important field crops in both the developed and developing countries and are fully implemented but with some liberalization in the VCU testing period in many of the developed countries (i.e., reducing the traditional three-year period to two years or even one year). On the other hand, the VCU determination for vegetable varieties was either never imposed or was abolished long ago in the developed countries and in an increasing number of developing countries because it was considered inappropriate, meaningless and therefore unnecessary.

The risks associated with planting an unadapted field crop variety are substantial. Production important for food supply and security can be drastically reduced. The detrimental effects can be spread and perpetuated through the practice of seed saving and neighbor-to-neighbor diffusion common for field crops. The well-known case of the registered blast-susceptible rice variety in Egypt some years ago illustrates very well the risks and damage associated with unsuitable field crop varieties. In contrast, the risks associated with planting a new vegetable variety that might not be well adapted are minimal and limited. First, only a few of the best and most progressive vegetable growers change to a new variety, and usually for only a portion of their planting after either observing the variety in demonstration plots or being reliably informed about its satisfactory qualities. The other growers change to a new variety only after they have observed its performance several times in several locations and are confident of its acceptability in the market. Secondly, the progressive vegetable growers who take on new varieties (i.e., the early adopters) do not save seeds or spread the seeds to neighboring growers. They purchase the seeds needed for planting. Thirdly, if a new variety performs poorly, the grower will drop it and return to the previous variety planted or change to some other variety of known performance. The only possible damage is to the early-adopter grower and to the seed company's reputation. There is no

danger or damage to the country's food supply and food security. Finally, farmers producing vegetables for their own subsistence (i.e., home gardeners) plant traditional or well established varieties; they are not attracted to new varieties until they come into widespread use (i.e., are no longer new).

Compared to the minimal risks associated with a new variety, the potential benefits from the early adoption of a new variety can be considerable to early-adopter growers and commercial vegetable production in general. The reason why a vegetable grower, group of growers, cooperative, etc., change to a new variety is either to maintain a market position or gain some advantage in productivity and/or marketability over the competition that translates into higher market prices and/or market share. When this strategy is successful, the benefits to the adopters and the whole subsector can be great; when it fails, their position is probably no worse than if the variety had not been changed. But if they are impeded from changing to a promising new variety due to variety registration requirements and their competition is free to make the change, the consequences in terms of market position can be disastrous.

2.4 Situation in Other Countries

The U.S. does not require registration of varieties for any agricultural crop. However, the DUS determination is embedded in the legal definition of a variety and is verifiable/enforceable under the truth-in-labeling provisions of the federal and state seed laws. The European Union requires only the DUS determination for vegetable varieties; there is a strong liberalization trend to use DUS only for variety protection. A DUS determination for a vegetable variety in any EU country for the purposes of variety registration or variety protection is accepted in all the other EU countries. Few if any of the European countries now in the EU have ever required the VCU determination for vegetable varieties. None of the OECD countries require VCU determination for registration of a vegetable variety, but many require some sort of registration based on DUS evidence with a very liberal interpretation. Most of the developing countries (although unfortunately not all) either never imposed the VCU determination for registration of vegetable varieties or have dropped it, but many still require registration based on evidence of DUS. India, which is often held up as an example of a country awash in regulations and a major producer and user of vegetables since most Hindus are vegetarians, long ago adopted a so-called Open General Licensee policy whereby no release, evaluation, or notification (Indian equivalent to registration) is required for the import of seeds, hence varieties, of vegetable crops, flowers and ornamentals. They are subject, however, to truthful labeling provisions of the Indian seed law. Some countries (e.g., France and the Netherlands) have adopted "accelerated registration" procedures that allow marketing of seeds of a vegetable variety while its application for registration is being considered and processed. In summary, the nearly unanimous view and practice in the developed countries and in most developing countries is to allow the market to determine the value of vegetable varieties. Unfortunately, this view and practice has not yet been fully accepted in Egypt.

3. Legal Basis for Variety Registration Requirement

3.1 Law of Agriculture Issued Under Law No. 53 of 1966, Chapter 2:

“**Article 10** The Minister of Agriculture shall issue a decree defining the agricultural crops to which the provisions of this part of the Law of Agriculture apply.” (Underlining added for emphasis.)

“**Article 13** The Committee (Committee on Registration of Varieties) is entitled to request the applicant to furnish it with (all) necessary information (about the candidate variety) and to provide it with what it deems (an) adequate (quantity) of the variety’s seeds for experimentation (trials and tests). It also has the power to designate (delegate) to the competent technical agencies the task of testing and experimentation. The period of experimentation (testing, trials) shall not be less than three years. The new variety shall not be registered unless it is proven, through testing, (to be) superior to the other varieties in one or more agricultural or economic characteristics.” (Text in parentheses is for clarification; underlining is added for emphasis.)

“**Article 14** No new variety shall be planted (on commercial basis) prior to its registration.” (Text in parentheses is for clarification.)

“**Article 15** For scientific reasons or for the purpose of producing new varieties, unregistered varieties may be cultivated, on condition that a permission is granted by the Ministry of Agriculture wherein the location and area to be cultivated to these (unregistered varieties, strains) shall be specified.” (Text in parentheses is for clarification.)

Note: The revised/amended Law 53 that has been before the People’s Assembly for several years retains the general “enabling” provision requiring registration of crop varieties and directs and authorizes the Minister, MALR, to develop and decree the specific requirements for registration of crop varieties, the crop species subject to the registration requirement, and the implementing particulars.

3.2 Ministerial Decree No. 1064 of 1995

“**Article 1** Provisions of Article 10 of Chapter 2 of Agriculture Law No. 53 of 1966 specifying agricultural crops to be registered shall be applicable on agricultural crops specified in Annex 1.” Annex 1 is a list of agricultural crops for which provisions of Article 10 of Chapter 2 of Agriculture Law No. 53 of 1966 is to be applied. 1. Field crops, 22 species are listed; 2. Vegetable crops, 19 species are listed, as follows: peas, haricot, cowpea, potatoes, watermelon, melons, marrow, tomatoes, strawberries, garlic, cantaloupe, cucumber, cabbage, cauliflower, *Corchorus olitorius*, spinach, okra, eggplant, pepper.

3.3 Ministerial Decree No. 82 of 1998. Agriculture Crop Variety Registration Protocols and Guidelines

Section V. Variety Testing and Registration Fee Structure. Tables 1 and 2 specify testing and registration fees for 24 field crops and 27 vegetable species. This compares to the 22 field crop species and 19 vegetable species specified in Ministerial Decree No. 1064 of 1995. The eight additional vegetable species are artichoke, carrot, lettuce, broccoli, pumpkin, celery, parsley, and radish.

4. Present Situation in Vegetable Variety Registration in Egypt

The vegetable seed companies contend that there has been very limited implementation of reforms proposed and agreed to in registration of vegetable crop varieties. The registration process is lengthy, exceeding three years in many cases, which is about the period of use of many of the new high quality varieties, especially the hybrids. Thus, a variety can become obsolete and be replaced before it is registered, and farmers are denied access to and the benefits from the newest and best varieties for production. Not surprisingly, another main consequence of the bottleneck imposed by the time-consuming and rather inconsistent process of variety registration on access to the new varieties is the relatively common evasion of it in several ways—including seed smuggling and misrepresentation of varieties. This is most unfortunate, because in retaining obsolete regulation on introducing new varieties, the GOE provides incentives for their evasion through smuggling and misrepresentations and essentially forfeits any control over the very substantial portion of vegetable seeds involved in illegal activities.

4.1 Recent Reforms. The most significant and recent reform in the variety registration requirement for vegetable crops was an agreement by the Egyptian-German Executive Committee in Seed Sector meeting of 21/02/1999 that, *“For imported varieties registered in OECD member countries (except for strategic crops) no registration is required. On the other hand, VCU tests of one-year duration have to be carried out in order to determine the suitability of the variety for Egypt and its resistance to pests and diseases.”* This agreement was subsequently and significantly modified in the Mid-Term Plan for Variety Evaluation, Registration and Plant Breeder’s Rights agreed to by the MALR and GTZ in October 1999 as follows:

“DUS for vegetables and fruits will be done only for new varieties that are bred in Egypt as was agreed already. For OECD registered vegetable varieties no new DUS will be done in Egypt. Instead, DUS-data from the respective OECD-country must be submitted upon registration and only a one-season resistance to pests and adaptation tests are carried out.”

And, in a subsequent section of the Mid-Term Plan:

“It is also agreed that VCU trials are only performed for field crops and not for horticultural crops...Instead, in Horticulture Crops only a 1-season resistance to pests and adaptation tests are carried out. VRC (the Variety Registration Committee) will decide the responsible institution for this test.” (Text in parenthesis is for clarification.)

The agreements cited have been implemented by the Variety Registration Committee (VRC) in at least two instances: for a tomato variety developed by Novartis with DUS determination in the Netherlands; and, surprisingly but interestingly, for a canola variety developed by Cargill with DUS determination in France. Canola is an oil-seed field crop and not a vegetable. The VRC took the decision to approve registration of the two varieties in Egypt over the objections of two of its members. The tomato variety had been subjected to only one season of testing while the canola variety had been subjected to one year's testing.

4.2 Inconsistencies, Deficiencies and Problems

It might appear that in beginning to implement the MALR-GTZ agreements relating to registration of vegetable varieties even over the objections of some members of the VRC, the long-desired and long-sought reforms are very close to being accomplished. Unfortunately, such a conclusion based on the first step cited would be premature. There are potentially very serious problems in the agreements and very little basis to expect that the agreements will be implemented in an efficient, equitable, and transparent manner.

One-season, one-year testing for adaptability and disease/insect resistance. The agreement's terms of not requiring VCU determination for horticultural crops and then mandating a “1-season resistance to pests and adaptation tests” are inconsistent. The testing of a variety for adaptation and pest resistance is an important part of the VCU determination. Changing the wording to *one-season's observations of the variety in a field planting shall be carried out as part of the registration procedure* would eliminate any reference to or implication of VCU while permitting the agency responsible for registration to make any or all observations of the variety that it desires during the one season. This might prevent the reimposition of VCU after some problem or complaint. It is also noted that the exception specified for “strategic crops” in the original MALR/GTZ agreement is causing some difficulties in deciding which vegetable crops are “strategic” and is inconsistent with the apparent intent of facilitated registration of varieties registered in OECD countries. It is noted, however, that the one-season mandate does not meet the requirements of the D.10 benchmark.

Acceptance of registration or protection of a variety in an OECD country as valid evidence of DUS. The major suppliers of vegetable varieties and seeds to Egyptian vegetable growers are the U.S. and The Netherlands. Japan is also a significant supplier. The three countries are all members of OECD. The U.S., however, does not require registration of crop varieties and most of the hybrid varieties are not protected because the built-in biological protection in a hybrid variety is deemed adequate. The Netherlands does require registration but probably not for all the hybrids it markets in other countries. Japanese suppliers also do not register or protect all

vegetable varieties, especially hybrid varieties. Implementation of this aspect of the agreed-upon reforms of variety registration for vegetable crops would mean that varieties from The Netherlands could be registered after one season's observations as in the case of the Novartis tomato cited above. However, a variety from the U.S. (typically not registered or protected) could be subject to the full three-year testing regime for DUS determination, which would be an unacceptable interpretation.

Obviously, some provision is needed for equal treatment for varieties from countries such as the U.S. that do not require variety registration but rely on the legal definition of a variety for validation of DUS. One possibility is that DUS determination will not be required for varieties registered in an OECD country or legally accepted as a variety in an OECD country that does not require pro forma registration of varieties. Another possibility is that the DUS determination or its equivalent in an OECD country shall be accepted as evidence of DUS for the purposes of vegetable crop variety registration (in Egypt).

The time problem. The vegetable seed companies generally agree that the multi-year length of the registration process has been and still is the most serious bottleneck. Reducing the testing period to one year or one season as in the agreed-to reforms accomplishes very little if delays in the handling and processing of applications, in reaching decisions once the testing/observations are completed, and other inefficiencies extend the period of the total process to two or three years. Seed companies would like some strong assurance or guarantee that the decision on an application for registration of a vegetable variety - positive or negative - will be rendered within one year from the date of application or sooner (i.e., decision rendered within the period of one growing season for the applicant crop, since the length of the growing season varies with the crop from 30 days for radish to 100+ days for some melons and even longer for head cabbage) plus two months, or better still, a decision rendered forthrightly.

5. Definitions and Accepted Meanings of Terms Used in Variety Registration

Multiple misunderstandings, misinterpretations, and lack of comprehension exist regarding crop variety registration. The following sections attempt to clarify the terminology and improve comprehension.

Crop Variety Registration. The seed laws and regulations of many countries require registration of varieties of specified crop species before commercial planting. Variety registration involves a formal application for registration, a determination of the authenticity of the variety (i.e., DUS) and in most countries for varieties of important and strategic field crops but not for vegetable crops, a determination of the value (performance) of the applicant variety for cultivation compared to varieties already available (i.e., VCU determination). A variety that meets the DUS and VCU criteria when required as well as other administrative requirements is entered into an official Register of Crop Varieties and becomes eligible for commercial production, seed importation, seed production, and marketing in the country.

DUS Determination (Testing). The purpose of the DUS determination is to establish the authenticity, or the genetic identity, of a plant variety. DUS is the acronym for the three technical criteria for a plant variety:

D = distinct. A variety must be clearly distinguished by one or more morphological, physiological or other characteristics that are genetically determined and can be precisely described and recognized from all other known and recognized varieties.

U = uniform. A variety must be sufficiently uniform in its relevant and described features, taking into account variations associated with its propagation.

S = stable. A variety must be stable (i.e., unchanged) through repeated reproductions, or for hybrids at the end of each cycle (i.e., F1 generation).

The DUS determination involves field, laboratory and/or biochemical analyses and comparisons. The field tests are in one to two locations for one or two years even for field crops; one year or less for vegetables in most countries.

Plant Variety. DUS are also the defining characteristics in the legal definition of a plant variety. In countries where variety registration is not required (e.g., the U.S.), the legal definition of a variety accomplishes the same thing as the DUS provision of variety registration. However, it is verified and enforced at the marketing level as an aspect of truth in labeling rather than at the pre-production stage.

Plant Variety Protection (PVP) or Plant Breeder's Rights (PBR). PVP and PBR are interchangeable terms used in the application of intellectual property rights (IPR) to plant varieties. Ownership rights are awarded to the developers of new plant varieties that met the DUS criteria for a variety. The international coordination for PVP is achieved under the several conventions of UPOV, the Union for the Protection of Plant Varieties.

VCU Determination (Testing). VCU is the acronym for Value for Cultivation and Use. VCU deals with a variety's field performance (e.g., yield, maturity, and utility, as in bread wheat) as compared to some standard or control variety(ies) in current use. In terms of VCU, a new variety is generally expected to be superior in some significant attribute of performance or utility quality to the standard or control varieties. The VCU determination involves multi-location, multi-year field trials (traditionally three years but currently two or fewer years in progressive countries) by an independent agency in an appropriate experimental design with controls and statistical analysis of the results.

Phytosanitary Certification and Standards. There are two distinct applications of phytosanitary certification and standards. First, phytosanitary certification and standards are part of the quarantine laws that function to prevent the entry of new plant diseases and pests into the country in imported seeds, plant materials, soil, etc. Seeds imported into Egypt must have a phytosanitary certificate that certifies compliance with Egypt's phytosanitary standards and are subject to inspections and tests to check compliance. Second, phytosanitary certification and standards are sometimes incorporated in seed certification standards for important seed-borne diseases of some crops (e.g., the bunt disease of wheat, or the bacterial blight of bean). Seed that do not meet the standards are not certified.

Phytosanitary standards are not connected in any way with the DUS or VCU determinations. Reform of the registration requirements for vegetable varieties would not change any of the phytosanitary standards applicable to imported seeds. It should be noted, however, that unrealistic phytosanitary standards for imported seeds constitute an important non-tariff trade

barrier, and that an international "seed health" initiative is underway to rationalize regulations relating to seed health issues which includes phytosanitary standards for imported seeds.

II. FACILITATING PRE-REGISTRATION ENTRY OF NEW VEGETABLE VARIETIES AND ADVANCED STRAINS FOR "SCREENING" AND TRIALS

Proposed Policy Benchmark:

"The GOE will encourage international seed companies to conduct pre-registration trials of new vegetable varieties ("screening") by permitting the import of sample seeds for multi-location trials under farmers' conditions."

1. Justification

Screening trials of vegetable varieties to determine those that are best adapted to the conditions for vegetable production in Egypt (or any country) and most acceptable in terms of the domestic and export markets are essential steps in reaching decisions on the specific varieties that should be released and registered for commercial production in the country. They are, in every sense, the final step in plant breeding and variety improvement. Clarifying and liberalizing the provisions in Ministerial Decree No. 700 of 1994 that regulate the pre-registration import of seeds for "scientific and experimental" purposes are required to facilitate and encourage the pre-registration screening of vegetable varieties and advanced strains in Egypt. Achieving this reform combined with reforming the requirements for registering vegetable varieties as established in present Benchmark D.10 would essentially complete the reforms needed to provide Egyptian vegetable producers with early and easy access to the very best, high quality vegetable varieties for their conditions which they deserve and must have to develop vegetable production in Egypt to its full potential.

2. Legal Basis and Current Regulations

The legal basis for regulation of the import of seed is the Law of Agriculture issued as Law No. 53 of 1966, Chapter 8, Articles 53-55. The pertinent regulations on importation of seeds into Egypt are in Ministerial Decrees No. 91 of 1967 and No. 700 of 1994, which in effect amends some of the provisions in Decree No. 91 of 1967. The operative provisions and regulations are in Article (1) bis, Ministerial Decree No. 91 of 1967 as amended (added) by Ministerial Decree No. 700 of 1994:

"Non-registered or non-recommended seeds shall not be entitled to an import permit unless under the following conditions:

1. Importation of the planting seeds must be solely for scientific purposes or for the development of new varieties by an academic or research agency or private producer with a landholding (one plot) spacious enough to plant the licensed volume of the imported seeds. Handling of or trade in those seeds shall not be permitted except after evaluation and registration thereof.
2. The land on which the aforementioned seeds shall be grown must fulfil the requirements

- of isolation from areas where other varieties of the same species are multiplied.
3. The import permit must specify the seed quantity to be imported, the variety, the agency and the area to be grown to that volume.
 4. The licensee pledges to submit a catalogue and a sample of the imported shipment to be referred by the Planting Seeds Committee to the competent research institutes for monitoring and evaluation in accordance with the provisions of the aforementioned Ministerial Decrees Nos. 823 of 1983, 935 & 937 of 1988 and 42 of 1993.
 5. Fields grown to these seeds shall be liable to monitoring and supervision by MOA's technical and research agencies.
 6. No additional quantities of the same seeds shall be licensed except after receipt of evaluation reports from the competent research institutes, confirming the distinctness of the earlier shipment."

3. Background and Explanation

The two critical changes required to improve access of Egyptian vegetable growers to the new, high quality varieties are listed below:

- Simplification and reduction of the requirements for registration or approval of a variety for use in Egypt (see I. above) by a) eliminating the VCU determination, b) accepting evidence for imported varieties of their registration, protection, or legal status as a variety in conformity with internationally recognized protocols such as those of OECD or UPOV as validation of DUS for the purpose of their registration in Egypt, c) reducing the three-year testing to at most a one-growing season for the applicant variety, and d) retaining the DUS determination for vegetable varieties developed in Egypt and imported varieties without evidence of DUS but reducing the testing period from three years to two seasons or one year.
- Revise the regulations and procedures for the pre-registration entry (import) of seeds of new vegetable varieties or advanced strains (i.e., before registration) to expedite, simplify and facilitate pre-registration trials and screening of varieties to determine those best adapted to production conditions and practices in Egypt and most suitable in terms of the local and export markets. Such pre-registration trials are essential to provide the information needed to determine the best varieties for application for registration and use in Egypt. Without this direct information, suppliers must rely on somewhat indirect information from trials, screenings and demonstrations in other countries (e.g., Jordan, Lebanon) and "irregular" trial plantings (from smuggled seeds) in Egypt to decide which varieties to apply for registration and commercialization in Egypt. This is an unfortunate situation, because Egypt is the biggest producer of vegetables in the region and is the country with the greatest potential as an exporter of vegetable products to Europe and the affluent but less-favored Middle East countries. Egypt's growers deserve the best vegetable varieties based on the best and most direct information.

These two reforms are interdependent. Essentially, they are interrelated aspects of the problems in accessing new varieties for the Egyptian vegetable growers in a timely, simple and consistent manner. Adopting reforms in the registration requirements and procedures would be a great forward step, but it does not resolve the difficulties in trying out varieties and advanced strains to

determine those for which to apply for registration. Similarly, adopting the pre-registration screening and trials reforms would be enormously helpful in determining the varieties that should be registered for use in Egypt, but little would be gained if the registration process takes three years or longer. The vegetable growers and the vegetable produce industry need both reforms to meet their competitors on equal terms and to use their unrivaled assets of great soil, climate, water supply and good farmers to achieve dominance in the fresh produce market in Europe and the Middle East.

The main purpose of the 1994 amendments (Ministerial Decree No. 700) quoted above was to make possible the pre-registration importation of small quantities of seeds of crop varieties by private seed companies and cooperatives for crop breeding (genetic lines) and for trials and screenings to determine those best suited to conditions in the country and for which application for registration should be made. This purpose, however, was not achieved. The problems confronting vegetable seed companies trying to gain pre-registration entry permits for seeds of new varieties for screening and trials in the year 2000 are essentially the same as they were in 1994. Delays and denials are still the common responses to requests and applications for entry permits. Thus, the 1994 amendment is a prime example of a well intended and carefully thought out reform that got lost in the ambiguities of a phrase added here, a qualifier there and, especially, in the interpretation of its provisions to favor the *status quo*, viz.:

- Demonstration, trial and screening of varieties and advanced strains are frequently interpreted as not meeting the "scientific purposes" and "development of new varieties" conditions for importing small quantities of seeds of non-registered varieties and strains. The interpretation is based on the contentions that demonstrations and general field trials are marketing tools and not research or plant breeding, and that screening of new varieties is not development of new varieties.
- An applicant vegetable seed company is frequently judged as not qualifying for scientific work and development of varieties unless it has a recognized research unit in its organization or is a branch or subsidiary of a recognized research and development company. Authorized agents and representatives don't qualify, regardless of the technical expertise they can access from the company they represent.
- The landholding requirement (experimental plot) is frequently interpreted as requiring proof of ownership. Rented or contracted plot land is judged as unacceptable.
- Provisions 4 and 5 of Article 2 in Ministerial Decree No. 700 of 1994 are frequently interpreted as involving testing by the "competent research institute" in a sort of pseudo-registration manner with assessment of the fees applicable to registration. Thus, a company that would like to bring in 5-10 or more varieties or strains for screening and field trials could be assessed the fees applicable to tests for 5 or 10 varieties for registration. Fees are an important source of funds for the research institutes and perhaps a major reason for opposition to reforms in variety registration and related issues. They should not, however, be applied in ways that contravene or distort the intent of provisions of ministerial decrees.

3. Regulatory Reform Needed

The provisions of Ministerial Decree No. 700 of 1994 need to be amended to include the following:

- a) specifically define "scientific purposes or for the development of new varieties" to include pre-registration screening trials of new varieties and advanced strains,
- b) specifically include seed companies affiliated with or the authorized representative of international vegetable seed companies as qualifying for import of seeds for screening trials, and
- c) liberalize the landholding requirement to include renting and leasing of land for trials.

These amendments could be made while retaining or incorporating suitable controls to prevent abuses. The controls could include limits on the quantities of seed that could be imported for trials, a statement of the specific purpose of the trials, information on the location and time of the trials, guaranteed access of competent researchers and specialists to "observe" the trials at convenient times mutually agreed to by the importing company and the researchers.

5. Proposed Revision and Amendments

Rescind Article 2, Ministerial Decree No. 700 of 1994 and Article (1) bis as amended, Ministerial Decree No. 91 of 1967, and replace with the following provisions:

Pre-registration importation of seeds shall not be permitted except for the purposes stated and conditions prescribed in the sections that follow:

- 1) Importation of the seeds must be solely for scientific investigations and research and development activities to include:
 - i. obtaining genetic lines for crop breeding;
 - ii. the pre-registration screening of varieties and advanced strains as the final and crucial step in the development of crop varieties; and
 - iii. field trials and demonstrations to obtain information on adaptability, consumer acceptance and other quality attributes needed in decisions on whether or not to apply for variety registration.
- 2) The applicant for an import permit for the purposes stated in no. 1 above shall be an academic unit, government research agency, private company engaged in crop variety research and development, or a private company or cooperative affiliated with or representing an international seed company recognized as a breeder and developer of crop varieties. ESAS shall be consulted regarding the credentials of a company applicant as may be necessary. The applicant shall own or have access to a plot of land through rent or contract that is suitable for experimental plantings and/or screening trials of the crop specified in the

application.

- 3) The application for a permit to import seeds shall include statements of the specific purpose for which the seeds are to be used. For activities ii) and iii) specified in no. 1 above, the application shall also include the identity and description of the varieties or strains, the location of the field plots in which the seeds will be planted, the area proposed for the plantings and a signed pledge that all the conditions and requirements set forth in these provisions will be observed.
- 4) The import permit shall be for limited quantities of seeds of the different crop species that do not exceed the quantities determined through consultations with ARC researchers and seed company officials as sufficient (maximum) for the purposes stated in no. 1 above and prescribed in an annex to these provisions. The seeds in the quantities desired and approved shall be packaged in clean, new and protective containers of a type and capacity to be stated in the permit. Each container shall be plainly labeled: **NOT FOR SALE; FOR EXPERIMENTAL PURPOSES ONLY.**
- 5) On receipt of the seeds imported for activities ii) and iii) specified in no. 1 above, the licensee shall provide the Seeds Committee with a sample of the seeds in the quantity specified for each kind in the Annex and information on the exact location of the plantings and the time they will be made. The licensee shall agree to provide access to and information on the screening trials or other plantings for observations by competent researchers and/or specialists designated by the Seeds Committee at times that are convenient and mutually agreed to by the licensee and designated observers. However, the observations and observers shall not interfere in any way with the importer's activities in fulfilling the purposes for which the import permits were issued.
- 6) Any seeds produced in fulfilling the purpose of the plantings shall be destroyed or processed for consumption.
- 7) The plot land on which the seeds are planted must comply with the isolation requirements that may be prescribed in the import permit.
- 8) All other provisions of Ministerial Decrees No. 91 of 1967 and No. 700 of 1994 shall remain in effect.

ANNEX E

MATERIALS FOR MINI-WORKSHOP

No. 1

MODERNIZING VEGETABLE VARIETY REGISTRATION

- Good progress in developing vegetable production, but:
 - Rapid changes take place in consumer preferences and varieties
 - Strong competition exists in export market
 - Competitiveness of Egyptian vegetable producers is decreased because obsolete variety registration requirements delay or prevent the entry of new, high quality varieties
 - Early and easy access to high quality vegetable varieties is important for maintaining export market share and critical for increasing market share
-

No. 2

WHY MODERNIZE VEGETABLE VARIETY REGISTRATION?

- Present requirements are antiquated and out of line with international practices
 - Present requirements do not recognize the great differences between vegetable and field crop production and producers
 - Vegetable producers urgently need easy and early access to the best vegetable varieties to remain competitive
 - Present requirements result in the smuggling of seeds, misrepresentation of varieties and other illegalities
 - Present requirements have high costs in terms of marketing and competitiveness but have little, if any, benefits
-

No. 3

BASIC FRAMEWORK FOR MODERNIZING VEGETABLE VARIETY REGISTRATION

- Variety registration is required in most countries
 - Variety registration should continue to be required in Egypt
 - Registration requirements should take into account the great differences between field crop and vegetable crop production and producers
 - Registration requirements should benefit rather than handicap vegetable production and producers
 - Phytosanitary standards are needed for imported seeds
-

No. 4

TECHNICAL REQUIREMENTS FOR VARIETY REGISTRATION

- VCU and DUS are the traditional technical requirements for variety registration
 - VCU means value for cultivation and utilization; a new variety must be superior to existing varieties in some significant way
 - DUS (distinct, uniform, stable) defines the genetic identity of a variety
 - VARIETY: a variety is legally defined as meeting the DUS criteria
-

No. 5

VCU DETERMINATION

- VCU determination has application for field crops but not for vegetable crops
 - Worldwide view is that VCU is meaningless for vegetable varieties because their value is determined by many subjective qualities that can only be established in the market
 - VCU determination for vegetable varieties is not required for registration in EU, all OECD countries, China, Brazil, Chile and other major developing countries
 - Egypt should not be the last major vegetable producing country to eliminate VCU for vegetable variety registration
-

No. 6

DUS DETERMINATION

- DUS determination is required in most countries for variety registration (except USA) and in all UPOV member countries for variety protection
 - DUS establishes the genetic identity of a variety; it needs to be determined only once
 - The DUS determination for vegetable varieties is completed in one year or less
 - In the EU and among OECD countries, a DUS determination in one country is accepted as validation of DUS for registration of a variety in the other countries
 - Egypt should accept DUS determinations made in other countries in accord with internationally accepted protocols
-

No. 7

EVIDENCE OF DUS DETERMINATION

Evidence of DUS determination would include:

- a registration certificate from an OECD country;
 - a plant protection certificate from a UPOV member country;
 - the listing of the variety in the National List of Varieties in any OECD country or in the EU Common Catalogue of Vegetable Varieties;
 - publication of a description of the variety in a scientific journal, and
 - other evidence of the legal status of a variety in an OECD or UPOV member country.
-

No. 8

RISKS OF MODERNIZING REGISTRATION
FOR VEGETABLE VARIETIES

- The risks are negligible
 - Vegetable seed business is very competitive; seed companies only register varieties they expect to perform very well
 - New varieties are registered; only the most progressive and market oriented growers seek and adopt the newest varieties to reduce costs and/or gain market advantage
 - Progressive, market oriented growers are aware of and accept the business risks of poor adaptability of a new variety to their conditions, a disease problem, or market acceptability problem
 - Small, poor, uneducated farmers who produce vegetables for their own consumption or for the local market do not seek or plant the newest varieties; they plant traditional varieties
-

No. 9

BENEFITS

- Enhanced competitiveness of vegetable producers
 - Increased share of export market for fresh vegetable produce
 - Development of vegetable production in Egypt to its full potential
 - Decrease in smuggling of seeds and misrepresentation of varieties which involve risks for all vegetable producers
 - Better control and regulation of vegetable seed supply in Egypt
-

No. 10

SUMMARY

- Present situation
 - Why modernize registration of vegetable varieties?
 - Technical requirements for registration
 - VCU, not required in most other countries
 - DUS, required but determination needs to be made only once
 - What Egypt needs to do: eliminate VCU; accept evidence of DUS from other countries (OECD and UPOV members)
 - Risks are negligible
 - Benefits could be very great
-

No. 11

THE CHOICE FOR EGYPT IS CLEAR

Egypt can modernize requirements and procedures for registering vegetable varieties and move to the forefront in the export market for fresh vegetable produce where it belongs, or it can retain the present obsolete and inappropriate system and let its competitors capture the market.

ANNEX F

SUPPLEMENTAL MATERIAL ON VARIETY REGISTRATION

Registration of 'WW-B.Dahl'
Old World Bluestem

'WW-B.Dahl' Old World bluestem [*Bothriochloa bladhii* (Retz) S.T. Blake] (Reg. no. CV-50, PI 300857) was released jointly by the USDA-ARS, USDA-SCS, Texas Tech University, and the Texas Agricultural Experiment Station in March 1994. Seed of WW-B.Dahl was collected near Manali, India, and forwarded to the Oklahoma Agricultural Experiment Station at Stillwater, OK, in 1960. It was grown in experimental Old World bluestem nurseries by Oklahoma Agricultural Experiment Station personnel under the designation, A-8965, until the mid-1960s at which time it was sent to the Southern Regional Plant Introduction Station at Experiment, GA. Seed of WW-B.Dahl was received from Experiment, GA, by the Southern Plains Range Research Station, Woodward, OK, in 1976 as part of Regional Project S-9. It was evaluated under the Woodward designation, WW-857. Following 15 yr of adaptation and production testing, WW-B.Dahl was selected as a superior Old World bluestem strain worthy of release in central and south Texas.

WW-B.Dahl Old World bluestem is a warm-season, tufted, perennial bunchgrass with an upright growth habit. It has dark-green foliage, with basal and cauline leaves 5 to 10 mm wide and 25 to 50 cm long at maturity. Foliage height averages approximately 0.70 to 0.90 m, with seed stalks reaching heights of 1.25 to 1.75 m. WW-B.Dahl is 3 to 5 wk later in maturity, more robust, and has larger cauline leaves than 'Plains', 'WW-Spar', 'WW-Iron Master', 'Ganada' (all *B. ischaemum* Keng) and 'Caucasian' (*B. caucasica* C.E. Hubb.) Old World bluestems. The outer glumes of WW-B.Dahl are distinctly pitted, whereas the above-mentioned cultivars, as well as Old World bluestem cultivars in the genus *Dichanthium* such as 'Angleton', 'Gordo', 'Kleberg', and 'Pretoria 90', do not have pitted outer glumes. The central axis of the panicle of WW-B.Dahl is longer than the longest raceme. It has sparse glandular hairs on the upper leaf surface, which emit a strong aromatic odor when foliage is crushed.

Adaptation trials in Oklahoma, Colorado, Kansas, Illinois, Kentucky, and Mississippi have shown WW-B.Dahl to have more winterhardiness than other accessions of *B. bladhii*, but less winterhardiness than the *B. ischaemum* cultivars WW-Spar, WW-Iron Master, Plains, or Ganada. WW-B.Dahl has good winterhardiness in Texas and New Mexico, as demonstrated by greater forage production compared with released cultivars of *B. ischaemum*.

WW-B.Dahl produced greater forage yields than other Old World bluestem cultivars in dryland trials at Justiceburg, TX, during 1988 (1), 1991 (2), and 1992 (3) and in irrigated yield trials at Los Lunas, NM, in 1982 and 1983 and at Las Cruces, NM, during 1983, 1984, and 1985 (4). Crude protein content was similar to that of other Old World bluestem cultivars at similar stages of plant development at Woodward in 1982,

1983, and 1984 and in trials at Las Cruces in 1983, 1984, and 1985.

Palatability of WW-B.Dahl was similar to that of WW-Iron Master, Plains, WW-Spar, and Caucasian bluestem based on free choice by stocker steers in animal acceptance trials at Woodward during 1979, 1980, and 1981. Average daily gain of steers grazing WW-B.Dahl was greater than that from Plains, WW-Spar, and Caucasian bluestem in 1985 and 1987 at the Southern Plains Experimental Range, Ft. Supply, OK. It is later in maturity, with a higher ratio of leaf to stem in late summer, which promotes increased weight gains during this time.

Stand establishment of WW-B.Dahl has been obtained on soil types ranging from sandy loams to clays at soil pH ranges from 6.7 to 8.4. In a greenhouse study, WW-B.Dahl produced more top and root growth on a pH 4.1 soil than did 24 other Old World bluestem accessions (5). It is not recommended for use on coarse sandy soils. WW-B.Dahl is susceptible to ergot [caused by *Claviceps purpurea* (Fr.:Fr) Tul.].

Plants of WW-B.Dahl are uniform, since seeds are produced apomictically and seedlings are genetically identical to the maternal parent. Seed has been increased through 10 generations, and off-type or variant plants have not been encountered. WW-B.Dahl will continue to breed true even when grown in close proximity to related strains of the same species.

WW-B.Dahl was named after the late Dr. Bill E. Dahl, long-time professor in the Department of Range and Wildlife Management at Texas Tech University, Lubbock.

Breeder seed of WW-B.Dahl will be maintained by the USDA-ARS Southern Plains Range Research Station, Woodward, OK; upon request, the corresponding author will provide a list of registered seed producers. WW-B.Dahl is a public cultivar; U.S. plant variety protection for this cultivar will not be sought.

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References and Notes

1. Dahl, B.E., H.D. Keese, and J.S. Pitts. 1988. Old World bluestems for west Texas. p. 21-22. In Research highlights. Dep. of Range and Wildlife Mgt., Texas Tech Univ., Lubbock.
2. Blair, B.K., C. Villalobos, R. Tower, and C.M. Britton. 1991. Evaluation of WW-857 at the Texas Tech Experimental Ranch. p. 21-22. In Research highlights. Dep. of Range and Wildlife Mgt., Texas Tech Univ., Lubbock.
3. Britton, C.M., C. Villalobos, and B.K. Blair. 1992. Evaluation of WW-857 for pasture seeding in Texas. p. 18-19. In Research highlights. Dep. of Range and Wildlife Mgt., Texas Tech Univ., Lubbock.
4. Lugg, D.C., F. Smith, Jr., and J.F. Gomez. 1987. Performance of warm-season perennial grasses in New Mexico. New Mexico State Univ. Agric. Exp. Sta. Bull. 729.
5. Foy, C.D., W.A. Berg, and C.L. Dewald. 1987. Tolerance of Old World bluestems to an acid soil high in exchangeable aluminum. Plant Soil 99: 39-46.
6. USDA-ARS, Southern Plains Range Res. Stn., 2000 18th St., Woodward, OK 73801. Registration by CSSA. Accepted 30 Nov. 1994. *Corresponding author (Email: !a03icwoodwar@attmail.com).

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Registration of 'Alliance' Wheat

'Alliance' (Reg. no. CV-799, PI 573096) is a hard red winter wheat (*Triticum aestivum* L.) developed cooperatively by the Nebraska Agricultural Experiment Station and the USDA-ARS. It was jointly released to seed producers in 1993 by the developing institutions and the South Dakota Agricultural Experiment Station. The name was chosen to honor the 40th anniversary of the founding of the Nebraska Wheat Development, Utilization, and Marketing Board; the 40th anniversary of the founding of Nebraska Wheat Growers' Association; the support of Nebraska Crop Improvement Association and the Nebraska Foundation Seed Division; and the interdisciplinary and interstate cooperative research efforts needed to develop this cultivar. Alliance was selected from the cross 'Arkan'/'Colt'/'Chisholm' sib (made in 1982 by Dr. J.W. Schmidt). Alliance is an F_3 -derived line that was selected in the F_4 , given an experimental line number in 1988, and tested as NE88595. Alliance was released primarily because of its high yield potential and resistance to diseases and insects in its area of adaptation.

Alliance is an awned, white-glumed cultivar. The foliage is green, with a waxy bloom at anthesis. The spike is middense and tapering. The glume is short to midlong and narrow to midwide. The glume shoulder is narrow and oblique to square. The beak is very short to short. Kernels are red colored, hard textured, and ovate. The kernel has no collar, rounded cheeks, midsize germ, large brush of medium length, and a narrow and shallow crease.

Alliance was tested in Nebraska yield nurseries starting in 1989, in the Southern Regional Performance Nursery starting in 1991, and in the Northern Regional Performance Nursery in 1993. In 4 yr of testing (18 location-years) in the Nebraska Intrastate Nursery, Alliance (3070 kg ha⁻¹) was 5, 7, 8, and 17% higher yielding than 'Redland', 'Vista', 'Arapahoe', and 'TAM 107', respectively. In 2 yr of testing (1992 and 1993) in the Nebraska Fall Sown Cereal Variety Trials (22 location-years), Alliance (3720 kg ha⁻¹) was 8% higher yielding than Arapahoe and TAM 107, and 4% higher yielding than Redland and Vista. In 2 yr of testing in the Southern Regional Performance Nursery (53 location-years), Alliance (3510 kg ha⁻¹) was 4% lower yielding than TAM 107. However, in the northern High Plains region (southwestern and western Nebraska, northwestern Kansas, and northeastern Colorado; 8 location-years), Alliance (3290 kg ha⁻¹) was 8% higher yielding than TAM 107. The recommended growing area for Alliance is western Nebraska and southwestern South Dakota.

Alliance is a semidwarf cultivar that is 4 cm taller than TAM 107 and 12 cm shorter than 'Scout 66', a conventional height wheat. It is similar in plant height to Arapahoe and Redland, but taller than Vista, and has moderate straw strength. The straw strength of Alliance is less than Redland, Siouxland, TAM 107, 'Abilene', and 'Thunderbird'. Alliance has a short coleoptile (66 mm) compared with TAM 107 (80 mm) and Scout 66 (105 mm). Given the short coleoptile, care must be taken to avoid planting Alliance too deep in dry soils, to prevent seedling emergence difficulties. The winterhardness of Alliance is adequate for Nebraska growing conditions, superior to 'Vona', 'TAM 200', and 'Rawhide', and similar to Scout

66. Alliance is a medium-early cultivar, 1.5 d later than TAM 107 and 1.5 d earlier than Arapahoe and Redland.

Alliance has exhibited moderate resistance to stem rust (caused by *Puccinia graminis* Pers.: Pers.) and carries the *Sr17* gene (which is no longer effective) and other, unidentified genes. In field tests by the USDA Cereal Rust Laboratory, St. Paul, MN, the adult plant reaction of Alliance to stem rust is lower infection than TAM 107, which is adequate for Nebraska conditions. Alliance has a heterogeneous reaction to the Great Plains biotype of Hessian fly [*Mayetiola destructor* (Say)], which may indicate that it contains the Marquillo-Kawvale gene for resistance or is heterogeneous for *H3* from Arkan. Alliance is susceptible to leaf rust (caused by *Puccinia recondita* Roberge ex Desmaz.) and soilborne wheat mosaic virus. Its reaction to wheat streak mosaic virus needs further testing; however, under artificial inoculation in greenhouse evaluations, it appears to be less susceptible than many Nebraska cultivars: similar to Redland and less tolerant than Vista. When crown rotting diseases [caused by *Bipolaris* (syn. *Helminthosporium*) spp. and *Fusarium graminearum* Schwabe] are present, Alliance appears to have more tolerance than many Nebraska cultivars.

The grain volume weight of Alliance is similar to Arapahoe, less than Siouxland, and superior to Redland. The milling and baking properties of Alliance were determined by the Nebraska Wheat Quality Laboratory using composite samples from 5 yr of testing with Arapahoe and Scout 66 as check cultivars. The average wheat and flour protein content of Alliance was lower than Arapahoe and similar to Scout 66. The dough mixing properties were similar to Arapahoe and stronger than Scout 66. While the baking absorption of Alliance was less than Arapahoe and Scout 66, average loaf volumes were greater than for these two check cultivars. The external appearance and internal attributes of the baked bread loaf indicated generally acceptable quality characteristics.

Breeder seed of Alliance will be maintained by the Nebraska Agricultural Experiment Station for at least 5 yr. Alliance will be submitted for registration and for U.S. plant variety protection under Public Law 91-577 with the certification option.

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References and Notes

1. P.S. Baenziger, B. Moreno-Sevilla, J.W. Schmidt, D.R. Shelton, D.D. Baltensperger, and L.A. Nelson. Dep. of Agronomy, C.J. Peterson, USDA-ARS and Dep. of Agronomy, and J.E. Watkins, Dep. of Plant Pathology, Univ. of Nebraska, Lincoln, NE 68583; D.V. McVey, USDA-ARS and Dep. of Plant Pathology, Univ. of Minnesota, St. Paul, MN 55108; J.H. Hatchett, USDA-ARS and Dep. of Entomology, Kansas State Univ., Manhattan, KS 66506. Alliance was developed with partial financial support from the Nebraska Wheat Development, Utilization, and Marketing Board. Cooperative investigations of the Nebraska Agric. Res. Div., Univ. of Nebraska, and USDA-ARS. Contribution no. 10642 from the Nebraska Agric. Res. Div. Registration by CSSA. Accepted 30 Sept. 1994. *Corresponding author.

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Registration of 'Kamiakin' Light Red Kidney Bean

'Kamiakin' light red kidney bean (*Phaseolus vulgaris* L.) (Reg. no. CV-123, PI 578270) was developed by the USDA-ARS in cooperation with Washington State University. Kamiakin was jointly released in September 1986 by the USDA-ARS, Washington State University, and the University of Idaho.

Kamiakin is an F₁₁ selection from the parentage 'Royal Red'/'Redkote'. Kamiakin was tested extensively in Washington and Idaho as K83 and K279. In 1985 and 1986, it was tested in the interregional cooperative dry bean nursery at 17 to 18 locations in the USA and Canada (2,3). Kamiakin seed yields equaled or exceeded those of the best cultivars in most locations. Its seeds are uniform and similar in shape to 'California LRK'.

It is unique among light red kidney (LRK) bean varieties in being resistant to the curly top virus and also carrying the dominant *I* gene for hypersensitive resistance to bean common mosaic virus (1). Like all other kidney-type bush cultivars, it is highly susceptible to fusarium root rot [caused by *Fusarium solani* (Mart.) Sacc. f. sp. *phaseoli* (Burkholder) W.C. Snyder & H.N. Hans.]. Kamiakin has determinate, strong, upright, red kidney bush growth habit and matures in 90 to 100 d. It provides virus resistance needed in the Pacific Northwest, where curly top and mosaic are serious hazards to susceptible red kidney cultivars. Cooking tests indicated that it produces an acceptable canned product (unpublished test results).

Breeder and foundation seed of Kamiakin are maintained by the Washington State Crop Improvement Assoc., Inc., 114 N. 5th Ave., Yakima, WA 98902-2642, and by the Idaho Crop Improvement Assoc., Inc., 1641 S. Curtis Rd., Boise, ID 83705.

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References and Notes

1. Ali, M.A. 1950. Genetics of resistance to the common bean mosaic virus (bean virus 1) in bean (*Phaseolus vulgaris* L.). *Phytopathology* 40:69-79.
2. Kolar, J.J. 1985. Annu. Rep. Coop. Dry Bean Nurseries, 36th. Univ. of Idaho Res. & Ext. Ctr., Kimberly.
3. Kolar, J.J., and J.R. Myers. 1986. Annu. Rep. Coop. Dry Bean Nurseries, 37th. Univ. of Idaho Res. & Ext. Ctr., Kimberly.
4. D.W. Burke (retired), M.J. Silbernagel, and J.M. Kraft, USDA-ARS, Irrigated Agric. Res. & Ext. Ctr., Prosser, WA 99350; H.H. Koehler (retired), Dep. of Food Science & Human Nutrition, Washington State Univ., Pullman, WA 99164. Registration by CSSA. Accepted 30 Nov. 1994. *Corresponding author.

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Registration of 'Kardinal' Light Red Kidney Bean

'Kardinal' light red kidney bean (*Phaseolus vulgaris* L.) (Reg. no. CV-122, PI 578269) was developed by the USDA-ARS in cooperation with Washington State University. In September 1986, Kardinal was jointly released by the USDA-ARS, Washington State University, and the University of Idaho.

Kardinal is an F₁₀ selection from the parentage 'Manitou'/'Pinto UI-114'/'3'/'Pinto UI-112'/'2'/'UI-112'/'PI 203958'/'4'/'Jacob's Cattle'. It is unique among light red kidney bean varieties in being resistant to the curly top virus and also carrying the dominant *I* gene for hypersensitive resistance to bean common mosaic virus (1). Like all other kidney-type bush cultivars, it is highly susceptible to fusarium root rot [caused by *Fusarium solani* (Mart.) Sacc. f. sp. *phaseoli* (Burkholder) W.C. Snyder & H.N. Hans.]. Kardinal has the determinate, strong, upright, red kidney bush habit, and matures in 90 to 100 d. It provides the virus resistance needed in the Pacific Northwest where curly top and mosaic are serious hazards to susceptible cultivars. Kardinal was tested extensively in Washington and Idaho as K333 and 6RK333. In 1986, it was tested in the interregional cooperative dry bean nursery at 17 to 18 locations in the USA and Canada (2). Seed yields, size, and color of Kardinal were comparable to those of the best commercial cultivars. The seeds are straight, some with blocky ends. Cooking tests indicated that it produces an acceptable canned product (unpublished test results).

Breeder and foundation seed of Kardinal are maintained by the Washington State Crop Improvement Assoc., Inc., 114 N. 5th Ave., Yakima, WA 98902-2642, and by the Idaho Crop Improvement Assoc., Inc., 1641 S. Curtis Rd., Boise, ID 83705.

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References and Notes

1. Ali, M.A. 1950. Genetics of resistance to the common bean mosaic virus (bean virus 1) in bean (*Phaseolus vulgaris* L.). *Phytopathology* 40:69-79.
2. Kolar, J.J., and J.R. Myers. 1986. Annu. Rep. Coop. Dry Bean Nurseries, 37th. Univ. of Idaho Res. & Ext. Ctr., Kimberly.
3. D.W. Burke (retired), M.J. Silbernagel, and J.M. Kraft, Agricultural Research Service, USDA, Irrigated Agric. Res. & Ext. Ctr., Prosser, WA 99350; H.H. Koehler (retired), Dep. of Food Science & Human Nutrition, Washington State Univ., Pullman, WA 99164. Registration by CSSA. Accepted 30 Nov. 1994. *Corresponding author.

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References and Notes

1. Singh, S.P., A. Molina, C.A. Urrea, and J.A. Gutierrez. 1993. Use of interracial hybridization in breeding the race Durango common bean. *Can. J. Plant Sci.* 73:785-793.
2. Castellanos-Ramos, J.Z., and J.A. Acosta-Gallegos. 1992. Aspectos de calidad en genotipos de frijol (*Phaseolus vulgaris*) de la región semiárida de México. *Agrociencia serie Fitociencia* 3:55-64.
3. J.A. Acosta-Gallegos, Bean Program, Valle de México Exp. Stn., Apdo. Postal 10, Chapingo, Méx. CP 56230, Mexico; J.Z. Castellanos-Ramos, Bean Program, El Bajío Exp. Stn., Apdo. Postal 112, Celaya, Gto. CP 38000, Mexico; S. Nuñez-González, Bean Program, Altos de Jalisco Exp. Stn., Apdo. Postal 56, Tepatlán, Jal. CP 47600, Mexico; R. Ochoa-Márquez, Bean Program, Pabellón Exp. Stn., Apdo. Postal 20, Pabellón, Ags. CP 20660, Mexico; R. Rosales-Serna, Bean/Cowpea-CRSP, Durango Exp. Stn., Apdo. Postal 186, Durango, Dgo. CP 34000, Mexico; S.P. Singh, Int. Ctr. for Tropical Agric. (CIAT), Apdo. Aéreo 6713, Cali, Colombia. Registration by CSSA. Accepted 31 May 1994. *Corresponding author.

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Registration of 'Hyden' Pea Bean

'Hyden' pea (navy) bean (*Phaseolus vulgaris* L.) (Reg. no. CV-124, PI 578271) was developed cooperatively by the USDA-ARS and Washington State University. Hyden was jointly released in 1985 by the USDA-ARS, Washington State University, and Oregon State University.

Hyden is an F_6 selection from 'Aurora'/Pinto UI-114'. Aurora is a small white bean developed at Cornell University, with hypersensitive dominant *I* gene resistance to bean common mosaic virus (BCMV) (1), resistance to curly top virus (CTV), and effective field resistance to fusarium root rot [caused by *Fusarium solani* (Mart.) Sacc. f. sp. *phaseoli* (Burkholder) W.C. Snyder & H.N. Hans.], Pinto UI-114 is a multiple-virus-resistant cultivar developed by the University of Idaho. Hyden was selected in the field for its ability to yield well under stresses of fusarium root rot and drought, as well as under salubrious conditions, in comparison with other small white and pea bean breeding lines and cultivars. It was tested interregionally for 3 yr as NW-230 in the cooperative dry bean nurseries (3), wherein it was among the earliest-maturing and highest-yielding cultivars in its class.

Hyden has an upright, open, indeterminate bush-vine growth habit, similar to Aurora, but is shorter and earlier in maturity. Hyden produces long purple-splashed pods set high and concentrated in the middle of the plant; pods mature in 90 to 95 d from planting. It is a unique pea bean in having resistance to both CTV and fusarium root rot, as well as *I* gene resistance to BCMV.

Seeds of Hyden are white, some having a buff pigmentation near the hilum opposite the micropyle. They are uniform in size (4.8 to 5.2 seeds g^{-1}) and in shape, slightly more oblong and flat than standard pea bean. Hyden was found satisfactory in cooking tests and in nutrient composition and sensory evaluations (2).

Breeder and foundation seed are maintained by the Washington State Crop Improvement Assoc., Inc., 114 N. 5th Ave., Yakima, WA 98902-2642.

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References and Notes

1. Ali, M.A. 1950. Genetics of resistance to the common bean mosaic virus (bean virus 1) in bean (*Phaseolus vulgaris* L.). *Phytopathology* 40:69-79.
2. Koehler, H.H., C.H. Chang, G. Scheier, and D.W. Burke. 1987. Nutrient composition, protein quality, and sensory properties of thirty-six cultivars of dry beans (*Phaseolus vulgaris* L.). *J. Food Sci.* 52(5):1335-1340.
3. Kolar, J.J. 1982 to 1984. *Annu. Rep. Coop. Dry Bean Nurseries*, 33rd to 35th. Univ. of Idaho Res. & Ext. Ctr., Kimberly.
4. D.W. Burke (retired), M.J. Silbernagel, and J.M. Kraft, USDA-ARS, Irrigated Agric. Res. & Ext. Ctr., Prosser, WA 99350; H.H. Koehler (retired), Dep. of Food Science & Human Nutrition, Washington State Univ., Pullman, WA 99164. Registration by CSSA. Accepted 30 Nov. 1994. *Corresponding author.

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Registration of 'Victor' Pink Bean

'Victor' pink bean (*Phaseolus vulgaris* L.) (Reg. no. CV-119, PI 578261) was developed by the USDA-ARS in cooperation with Washington State University. It was jointly released in December 1983 by the USDA-ARS, Washington State University, the University of Idaho, and Oregon State University.

Victor is an F_6 selection from the same parentage as 'Viva' (1) (i.e., 'Sutter Pink'/3/Red Mexican UI-35/PI 203958/2/Red Mexican UI-35). It was tested widely as 6R-122 and NW-122. Victor's seed yields equaled or exceeded the best at many locations (3).

Victor is resistant to the curly top virus and to the type and NY-15 strains of bean common mosaic virus (BCMV). It has effective field resistance to fusarium root rot [caused by *Fusarium solani* (Mart.) Sacc. f. sp. *phaseoli* (Burkholder) W.C. Snyder & H.N. Hans.] and, like other pink cultivars, it is comparatively drought tolerant. Victor has vigorous, short vines, and matures \approx 90 d after planting. This cultivar supplies an industry need for seeds larger than those of widely grown Viva (3.4 to 3.6 seeds g^{-1}). Seeds of Victor are similar in size (3.0 to 3.2 seeds g^{-1}) and color to those of Sutter Pink, a favored cultivar except for its susceptibility to all strains of BCMV. Food quality of Victor is similar to that of other commercial pink cultivars (2).

Breeder and foundation seed of Victor are maintained by the Washington State Crop Improvement Assoc., Inc., 114 N. 5th Ave., Yakima, WA 98902-2642, and by the Idaho Crop Improvement Assoc., Inc., 1641 S. Curtis Rd., Boise, ID 83705.

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References and Notes

1. D.W. Burke. 1982. Registration of pink beans Viva, Roza, and Gloria (Reg. nos. 25, 26, and 27). *Crop Sci.* 22:684.
2. Koehler, H.H., C.H. Chang, G. Scheier, and D.W. Burke. 1987. Nutrient composition, protein quality, and sensory properties of thirty-six cultivars of dry beans (*Phaseolus vulgaris* L.). *J. Food Sci.* 52(5):1335-1340.
3. Kolar, J.J. 1982 and 1983. *Annu. Rep. Coop. Dry Bean Nurseries*, 33rd and 34th. Univ. of Idaho Res. & Ext. Ctr., Kimberly.
4. D.W. Burke (retired), M.J. Silbernagel, and J.M. Kraft, USDA-ARS, Irrigated Agric. Res. & Ext. Ctr., Prosser, WA 99350; H.H. Koehler (retired), Dep. of Food Science & Human Nutrition, Washington State Univ., Pullman, WA 99164. Registration by CSSA. Accepted 30 Nov. 1994. *Corresponding author.

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'Juliette' Fresh-market Tomato

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Additional index words. *Lycopersicon esculentum*, F₁ rin tomato, tomato breeding

'Juliette' (*Lycopersicon esculentum* Mill.), released in Aug. 1992 for vine-ripe harvest, is a semi-determinate, red-fruited, fresh-market tomato developed at the Gosford Horticultural Research and Advisory Station in New South Wales, Australia. 'Juliette' may be grown as a midseason crop, using a support (e.g., trellises, stakes) or an on-ground cropping system. This plant produces a high large- and medium-fruit yield with a long storage life; the fruit are oblate, firm, smooth, and deep red (Nguyen et al., 1991). 'Juliette' also is resistant to fusarium wilt race 1 (*Fusarium oxysporum* f.sp. *lycopersici*), verticillium wilt strain 1 (*Verticillium dahliae*), root-knot nematodes (*Meloidogyne* spp.), and tobacco mosaic virus (TMV).

Origin

'Juliette' was evaluated under the experimental designation HRAS 85-1, an F₁ hybrid from the 79T1 x 795054-1 cross. Line 79T1 originated at the Univ. of California, Davis (R. Jones, personal communication, 1980; pedigree not available). This line is the source of resistance against *Fusarium oxysporum* f.sp. *lycopersici* (I gene), *Verticillium dahliae* (Ve gene), root-knot nematodes *Meloidogyne* spp. (Mi gene), TMV (Tm-2⁺ gene), and *Alternaria solani* (ad gene). Line 795054-1 was developed at the Univ. of Florida, East Bradenton, and it possesses the ripening inhibitor (rin) mutant (J.W. Scott, personal communication, 1982; pedigree not available) that is the source of the cultivar's long storage life.

Description

'Juliette' is a semi-determinate cultivar that produces a heavy foliage cover and averages 1.1 to 1.3 m in height on trellised systems. With on-ground cropping systems, foliage spreads to 1.2 m, providing a cover that protects fruit from solar injury.

'Juliette' matures in midseason. When harvested at the vine-ripe stage, the maturity date is similar to that of 'Flora Dade' and slightly later than that of 'Sunny'. This cultivar has produced yields similar to that of 'Flora Dade' and 'Red Centre' (Table 1) but produces a greater proportion of large fruit in trellised and on-ground cropping systems (Table 2). The

cultivar Juliette's oblate, smooth fruit have green shoulders when unripe and jointed pedicels; they ripen to deep red and are multilocular (Fig. 1). Fruit firmness, total soluble solids concentration, and titratable acidity (Sumeghy et al., 1983) of plants grown on trellises in Somersby, Australia, from 1987 to 1989 were not significantly different than those of 'Flora Dade' and 'Red Centre' (Table 1); however, 'Juliette' fruit have a 40-day storage life at 20C, which is similar to that of 'Red Centre' and 10 days longer than that of 'Flora Dade' (Nguyen et al., 1991). Therefore, F₁ rin fruit may be harvested at the breaker stage or when fully ripe without quality loss (Nguyen, 1991). The long storage life, desirable firmness (1.0–1.1 mm compression), large

fruit (≥80 mm in diameter), and jointed pedicels of 'Juliette' likely will permit successful production for Asian markets, where attractive, fresh-looking fruit with attached pedicels are in demand.

Availability

The cultivar Juliette's commercial seed is available from Canavon Pty., P.O. Box 84, Armidale, NSW 2350, Australia. Also, small samples for trial and for breeding purposes may be obtained from V.Q.N.

Literature Cited

- Nguyen, V.Q. 1991. 'Red Centre' fresh-market tomato. HortScience 26:1095–1096.
Nguyen, V.Q., W.J. Ashcroft, K.H. Jones, and W.B. McGlasson. 1991. Evaluation of F₁ hybrids incorporating the rin (ripening inhibitor) gene to improve the storage life and fruit quality of fresh market tomatoes (*Lycopersicon esculentum* Mill.) Austral. J. Expt. Agr. 31:407–413.
Sumeghy, J.B., D.O. Huet, W.B. McGlasson, E.E. Kavanagh, and V.Q. Nguyen. 1983. Evaluation of fresh market tomatoes of the determinate type irrigated by trickle and grown on raised beds covered with polyethylene mulch. Austral. J. Expt. Agr. Animal Husbandry 23:325–330.

Table 1. Marketable yield and fruit characteristics of 'Juliette' tomato grown on trellises in Somersby, Australia, from 1987 to 1989.^a

Cultivar	Marketable yield (t-ha ⁻¹)		Firmness (compression, mm)		Total soluble solids concn (°Brix)		Titratable acidity (ml 0.1 N-NaOH juice)	
	1987–88	1988–89	1987–88	1988–89	1987–88	1988–89	1987–88	1988–89
Red Centre	75 ab	78 b	1.1 a	1.0 a	4.0 a	4.2 a	5.4 a	4.9 a
Flora Dade	80 a	89 ab	1.3 b	1.0 a	3.0 b	4.5 a	6.1 a	6.4 a
Juliette	65 b	93 a	1.1 a	1.0 a	4.0 a	4.7 a	5.7 a	6.3 a

^aMean separation within columns by Duncan's multiple range test, $P \leq 0.05$. All experiments were replicated four times in a randomized block design.

^bTotal of eight harvests.

^cSmaller values indicate firmer fruit.

Table 2. Size distribution of tomato fruit grown using trellises (Somersby, Australia; 1988–89) and on-ground cropping systems (Tatura, Australia; 1987–88).

Cultivar	Fruit size distribution ^{a, b} (%)					
	Large		Medium		Small	
	Trellis	Ground	Trellis	Ground	Trellis	Ground
Flora Dade	2 b	14 b	78 a	58 a	20 a	28 a
Red Centre	4 b	19 b	81 a	67 a	15 b	14 b
Juliette	17 a	34 a	78 a	56 a	5 c	10 c

^aMean separation within columns by Duncan's multiple range test, $P \leq 0.05$.

^bLarge ≥ 80 mm in diameter; medium = 60–79 mm in diameter; small = 45–59 mm in diameter.

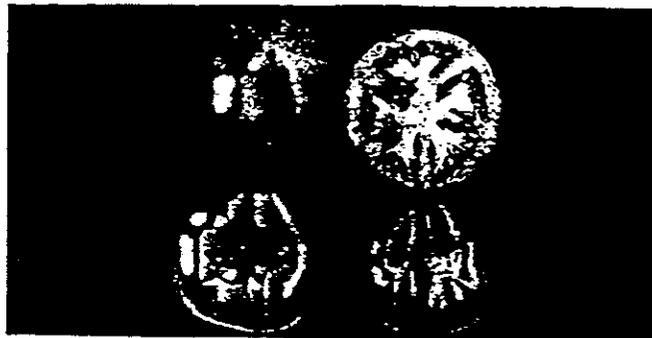


Fig. 1. 'Juliette' tomato fruit (scale is in centimeters).

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'Ice Cube', 'Blush', and 'Mini-Green': Miniature Crisphead Lettuce Cultivars

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Additional index words. lettuce breeding, *Lactuca sativa*, gibberellins, dwarf mutant, nutritional content

More than 80% of the lettuce (*Lactuca sativa* L.) consumed in the United States is of the crisphead type (U.S. Dept. of Agriculture, 1992). Over the last 100 years, taste and texture preferences of crisphead lettuce in the United States have undergone minor changes. Head size and weight have steadily increased, such that cultivars presently grown in this country are large (i.e., 16 to 22 cm in diameter). 'Ice Cube', 'Blush', and 'Mini-Green' are miniature crisphead lettuces that closely resemble standard cultivars in appearance, but attain about one-half the diameter (8 to 12 cm). Because of their size, these cultivars can be consumed by a person in one meal. The commercialization of miniature lettuce may lead to increased lettuce consumption by people who choose not to purchase lettuce of normal size for fear it cannot be consumed before spoilage.

'Ice Cube' and 'Blush' are adapted for production in the western United States, especially under the optimum growing conditions found in California and Arizona. 'Mini-Green' tolerates higher temperatures during heading and may hold some promise for eastern production areas and for home-garden use.

Origin

These cultivars were developed by the U.S. Agricultural Research Station, Salinas, Calif., and were released in 1992 (Fig. 1). They were derived from a cross: 86-1024 (dwarf-1) x 'Salinas'. 'Salinas' is the standard commercial cultivar used in the coastal districts of California. A double mutant, 86-1024 [early flowering (*Ef*) and dwarf (*dwf*)], was developed in 1986 by W. Waycott and L. Taiz, Univ. of California, Santa Cruz, for studying gibberellin (GA) biosynthesis (Waycott, 1989).

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¹Current address: Petoseed Co., 650 Leanna Drive, Arroyo Grande, CA 93420.

Line 86-1024 was isolated from an M₂ population of 81-1251-C-18-2, induced by germinating seeds in ethylmethane sulfonate (EMS) (Waycott, 1989). The M₂ population was developed by soaking seeds in aerated distilled water (≈20C for 24 h), then decanting and replacing the water with aerated 0.03% (v/v) EMS solution for 24 h. The seeds were then washed 30 min in aerated distilled water and sown in soil.

The F₃ breeding line, 81-1251-C-18-2, was derived from a cross between 'Vanguard 75' and an early flowering mutant '56779E' carrying *Ef-1 Ef-1*. Dwarf-1 carries the recessive allele *dwf-1* that we believe blocks GA biosynthesis. Dwarf-1 individuals contain ≈50% of the wild-type level of gibberellin A₁ (GA₁), the putative active GA in lettuce (Waycott et al., 1991). Although the miniature lettuce lines have not been tested, we believe them to be deficient in GA, as well, suggesting that their resultant phenotype is caused by reduced cell division and expansion (Sachs, 1965).

An F₂ population derived from 86-1024 x 'Salinas' was sown in the field in Salinas, Calif., during Spring 1988, from which 30 mini-lettuce selections were made. Individu-

als in this population were segregating red and green, and both types were selected. A sample of three F₃ families was grown in Huron, Calif., during the fall of the same year, and 12 single-plant selections were made from the three lines. During Spring and Summer 1989, 41 F₃ and F₄ families were grown in Salinas, and 62 single-plant selections were made from 20 families. Forty-two F₄ and F₅ families were grown the following year in the same location, and 79 single-plant selections were made from 18 families. In 1990, 62 F₅ and F₆ families were grown once in early spring and once in early summer in Salinas. From these plantings, 44 single-plant selections were made from 19 families. From these selections, the 10 best F₆ and F₇ families were bulked within families for observation in 1991. Based on the results of numerous trials in California, New York, and Pennsylvania, seven of the bulked families were increased in the greenhouse at the end of 1991. Three [91-1174M ('Mini-Green'), 91-1175M ('Blush'), and 91-1177M ('Ice Cube')] were chosen for release.

Description

Color. The three cultivars have dull, dark-green outer leaves that are slightly darker than those of the 'Salinas' parent. Green pigment extends quite close to the core, and the interior color is creamy-yellow. 'Blush' has a tinge of red on the outer leaves. Seeds (achenes) of all cultivars are black.

Size. The cultivars are firm to hard at maturity (Fig. 2). Size is equivalent to a mature Boston-type butterhead lettuce. Head is spherical to slightly flattened (transverse elliptical). The top of the head is well covered and may become spiraled during cold weather. The butt and the ribs are flat, while the core is small and the bases of the leaves overlap well.

Leaf type. The cultivars have mildly undulate leaf margins that are moderately dentate

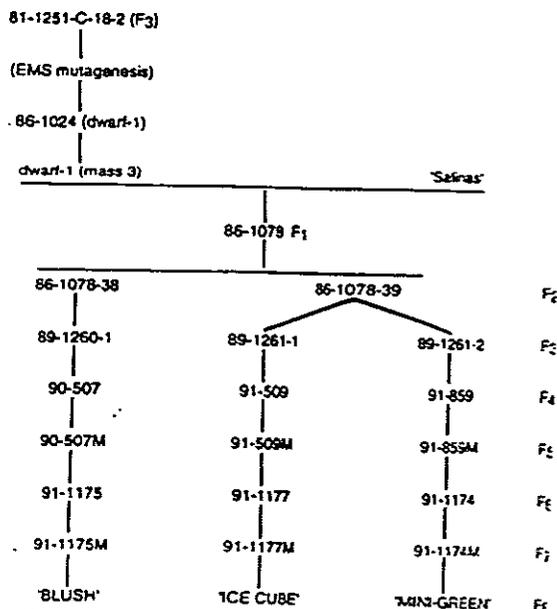


Fig. 1. Pedigrees of 'Ice Cube', 'Blush', and 'Mini-Green' miniature crisphead lettuce. EMS = ethylmethane sulfonate; M = mass.

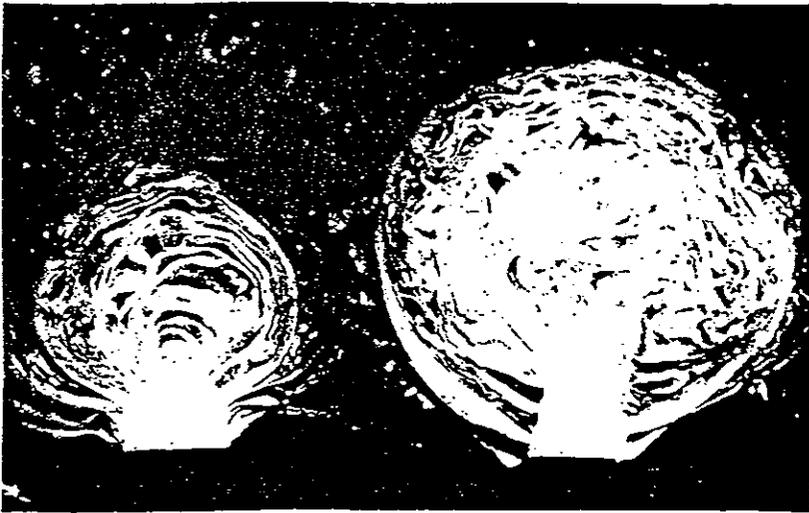


Fig. 2. Vertical cross sections of (left) 'Ice Cube' and (right) 'Salinas' lettuce. Note looser head of miniature type, indicating that it matures 5 to 10 days later than normal crispheads. Head diameters: 12.7 and 19.1 cm, respectively.

and strongly ruffled. Texture is relatively soft, slightly softer than that of 'Salinas'; the leaf surface is moderately blistered. Outer leaves are broader than long.

Disease reactions

'Ice Cube', 'Blush', and 'Mini-Green' are similar to 'Salinas' in disease reactions. They are susceptible to lettuce mosaic, cucumber mosaic, turnip mosaic, and big vein viruses. They are susceptible to corky root rot and sclerotinia (*Sclerotinia minor* Jagger), but are less prone to tipburn than 'Salinas' (Table 1). Although results are preliminary (unpublished), reaction to downy mildew (*Bremia lactucae* Regel) suggests this disease may not develop as rapidly on the miniature lettuces as on 'Salinas'. Preliminary data (unpublished) also suggest that these lines may be less preferred as a host by the green peach aphid (*Myzus persicae* Sulzer) than the 'Salinas' parent.

Performance and adaptation

'Ice Cube' (91-1177) and 'Blush' (91-1175) are virtually identical in appearance except that 'Blush' develops a red tinge on the exterior leaves. The F₃ generation of 'Mini-Green' (91-1174) was selected under higher temperature conditions (daytime as high as 37°C, nighttime as low as 19°C, in Huron, Calif.) and thus may have higher tolerance to heat than 'Ice

Table 1. Mean tipburn incidence and stem lengths of 'Salinas' and 'Mini-Green' lettuce measured during mid-summer conditions (mid-July), at 60 and 68 days after sowing, in Davis, Calif. Average daily highs during head formation were 37°C, and the daily mean was 25.8°C.

Cultivar	Stem ht (cm)		Tipburn (%)
	60 days	68 days	at 60 days
Salinas	15.2 ± 1.7	43.3 ± 9.2	53.4 ± 9.5
Mini-Green	3.9 ± 0.7	11.7 ± 1.1	11.3 ± 3.6

Cube' or 'Blush'. Maturation time for these plant types is slightly later than 'Salinas', up to 10 days in cool weather and ≈5 days in warm weather (Fig. 2). Initiation of rapid stem elongation (bolting) is delayed, while total plant height is substantially reduced (Table 1). Despite these delays, the tendency to develop a head was stronger than in 'Salinas'. Field trials in New York and Pennsylvania demonstrated that the miniature cultivars can withstand daytime highs of 30 to 33°C during the final weeks of growth in midsummer without a substantial loss in the ability to head.

Nutritional content

A composite sample from 12 separate heads of 'Salinas', 'Mini-Green', and 'Valmaine' (romaine type), grown under similar condi-

tions in the field, were analyzed for major nutritional components (Table 2). 'Mini-Green' contained slightly higher amounts of most components analyzed than did 'Salinas'. However, 'Valmaine' was substantially higher than either crisphead cultivar for nearly all nutritional categories, especially vitamin A.

Seed production

The GA deficiency and delay in maturity cause these cultivars to flower later and set fewer seeds than 'Salinas'. Gibberellin A₃ (GA₃) can be applied as a spray (to the point of runoff) to plants at concentrations of 10.0 to 50.0 mM (3.0 to 10.0 ppm), two or three times during the vegetative stage, to produce plants that phenotypically resemble the 'Salinas' parent. Applications should be made 3, 6, and 9 weeks after sowing. Care should be taken not to apply GA₃ too close to the flowering period, as it will cause sterility and poor seed set.

Seed availability

'Ice Cube', 'Blush', and 'Mini-Green' have been released to seed companies and are available in commercial quantities. Small quantities of remnant seed are available for research purposes.

Literature Cited

- Sachs, R.M. 1965. Stem elongation. *Annu. Rev. Plant Physiol.* 16:73-96.
 U.S. Dept. of Agriculture. 1992. Vegetable crops—Annual bulletin. U.S. Dept. Agr., Natl. Agr. Stat. Serv., Washington, D.C.
 Waycott, W. 1989. Genetic and physiological studies on stem elongation in lettuce (*Lactuca sativa* L.). PhD Diss., Univ. of California, Santa Cruz.
 Waycott, W., V.A. Smith, P. Gaskin, J. MacMillan, and L. Taiz. 1991. The endogenous gibberellins of dwarf mutants of lettuce. *Plant Physiol.* 95:1169-1173.

Table 2. Nutritional content of 'Salinas', 'Mini-Green', and 'Valmaine' lettuce per 100 g tissue (fresh weight).

Assay ^a	Salinas	Mini-Green	Valmaine
Calories	21.0 ^b	16.3	21.9
Protein (g)	0.8	1.2	1.5
Carbohydrates (g)	4.0	3.5	4.9
Fat (g)	0.2	0.3	0.3
Vitamin A (carotene) (IU ^c)	100	130	2950
Thiamine HCl (mg)	0.05	0.07	0.09
Riboflavin (mg)	0.02	0.03	0.09
Niacin (mg)	0.2	0.28	0.38
Vitamin C, total (mg)	3.6	3.2	10.7
Calcium (mg)	10.3	13.2	27.4
Iron (mg)	0.229	0.315	0.898
Sodium (mg)	22.5	20.9	45.6
Potassium (mg)	121.0	147.0	210
Phosphorus (mg)	18.4	22.3	27.5
Magnesium (mg)	6.34	8.24	15.3
Zinc (mg)	0.15	0.166	0.236
Copper (mg)	0.0204	0.0201	0.0306
Total fiber (g)	1.0	1.2	1.6
Moisture (g)	94.6	94.6	92.6
Ash (g)	0.4	0.4	0.7

^aAnalysis made from a composite sample of 12 field-grown plants performed by Hazleton Laboratories, Madison, Wis.

^bAll figures have an accuracy of ±5%, except for vitamin A, which has an accuracy of ±10%.

^cIU = international units.

of many varieties
Some wear many hats. AgriCapital wears just one.

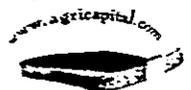
From Seed Trade News
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and
Seed Trade
Magazine



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genus & species

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Pickseed Canada Inc., Lindsay, Ontario, offers the alfalfa variety Pickseed 2065MF that combines high yield, strong traits for winter survival and vigorous regrowth. It also is resistant to

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aphanomyces and fusarium. This variety has good forage quality with higher intake and better digestibility for improved milk production in cattle. Call (1) 705 878 9240 or (1) 800 661 4769; e-mail ssummers@pickseed.com.

SALAD FIXINS

Johnny's Selected Seeds, Albion, Maine, announces new lettuce varieties Berenice, Hussarde and Ermosa. Continuing a relationship with Gautier Seeds of France, these varieties are lettuce mosaic virus (LMV) tolerant.



Berenice (shown here) has narrow dark green oak-shaped leaves and is heavier and more uniform. The dense compact heads are slow to bolt and are suitable for baby leaf and full head production. Hussarde is an arrowhead type oakleaf with dark green leaves and an attractive rusty red overlay. The densely compact heads are slow to bolt and can be grown for baby leaf and full head markets. It is suitable for spring, summer and fall production. Ermosa is a dark green, heat tolerant summer butterhead that performs well in areas with muck soils and

is considered the standard in regions where high summer temperatures make production difficult. Call (1) 207 437 4395; fax (1) 800 738 6314; e-mail commercial@johnnyseeds.com; visit www.johnnyseeds.com.

VEGETABLE MEDLEY

Seminis Garden, a division of Seminis Vegetable Seeds of Saticoy, California, announces three selections of garden vegetables for 2001.



•Granny Smith is a hybrid tomato with fruit that ripens without turning red. The fruit weighs 8 to 10 oz. and has solid flesh and a long shelf life. Granny Smith matures in 72 days and has disease resistance to V1, St and ASC.

•Summer Medley of hybrid squash blends includes Spacemiser, Butterstick, Goldbar and Topkapi. They create a blend of green and gold zucchinis and yellow summer and Mediterranean



squashes. Each grows compatibly on compact or semi-compact plants. Spacemiser is a green, high yielding zucchini that begins producing in 49 days. Butterstick is a bright lemon yellow, smooth, scar-resistant fruit that produces in 48 days. Goldbar is the earliest variety and ready with fruit in 43 days. Topkapi is a high yielder and generates fruit in 51 days.

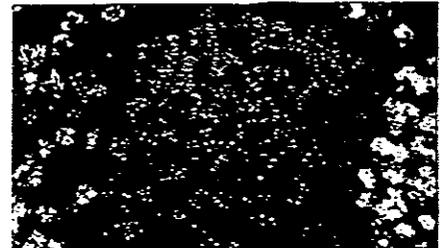


•Lugi hybrid pepper is a sweet pepper suitable for roasting, grilling or used fresh. It matures in 62 days from transplants and yields an average of 45 peppers per plant. It grows 24 in. tall, sets fruit freely and is resistant to races 1, 2 and 3 of bacterial spot. Lugi can be eaten green or allowed to turn red at full maturity.

Call (1) 805 647 1188; fax (1) 805 656 4818 for information on distribution or e-mail info@seminis.com.

FLOWER BONANZA

Ernst Benary Seed Growers, Germany, announces varieties for 2000-2001.



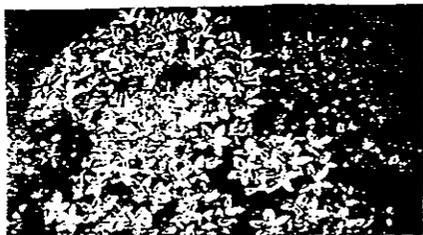
•Bluesylva is a *Myosotis sylvatica* that grows to 8 in. and is suitable for use as a pot plant. It has a compact habit with an abundance of medium blue flowers.



•Ring of Fire is a sunflower that grows 40-50 in. with petals that are dark red at the base and golden yellow at the tips. Flowers are 5 to 6 in. in diameter.

Ring of Fire is heavily branched with a good number of cuts and is also an All-America Selections (A.A.S.) winner.

• New Look Mix is a *Pentas lanceolata*



that grows 8 to 10 in. and is considered the first dwarf, basal branching pentas from seed. Heat and drought tolerant, this compact plant has star-shaped flower clusters. It is suitable for patio containers, baskets and as a flowering pot plant.

Call Benary Seeds at (1) 630 790 2378; fax (1) 630 790 2423 in the U.S. or call (49) 55 417 0090 in Germany.

CURCUBITS RESIST MILDEW

Harris Moran Seed Company, Modesto, California, reports that Magic Lantern pumpkin (shown here) has tolerance to powdery mildew, an annual problem in fall grown cucurbits. Evaluated in recent trials, this variety produced well, and



the fruit has excellent appearance. Also evaluated were Zucchini Elite, SSXP 788, SSXP 789, SSXP 793, SSXP 848, SSXP 850, all zucchini types and HMX 9736, an acorn type. Call (1) 209 579 7333; fax (1) 209 527 5312; international fax (1) 209 521 1524.

CORN AND SOYBEANS TO MARKET

Pioneer Hi-Bred International Inc., Johnston, Iowa, introduces 23 new soybean varieties for 2000. Fourteen have the Roundup Ready gene; two have the



Pioneer Hi-Bred International, Inc.

STS gene for Synchrony herbicide; nine are SCN-resistant varieties; and one is a white mold-tolerant variety. These varieties offer high yield with resistance to diseases like phytophthora root rot and brown stem rot.

New corn hybrids for 2000 include two TC Blend high oil products, two waxy hybrids and a TC Blend high-oil products that also contains the

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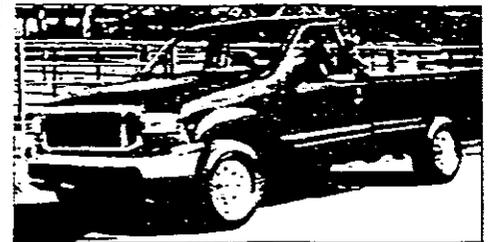
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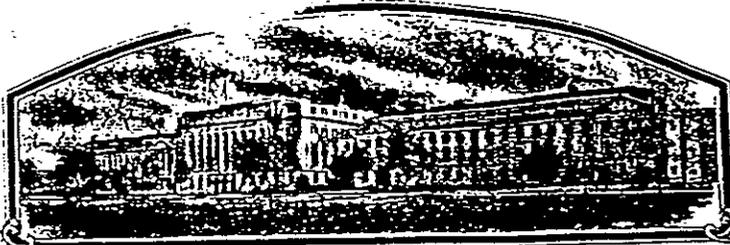
Royal Truck Body, Inc., Paramount, California, is offering Ford truck owners the Royal Sport that combines the Ford Super Duty chassis with the Royal Truck bed. This bed provides up to 34 cu. ft. of lockable storage space with a factory-look body. It features in-line au-



tomotive door-style handles, sealed-gas shocks to hold doors open. It has eight compartments and is available for eight or nine ft. beds. Built of two-sided galvanized steel construction, the truckbed has 12-gauge diamond plate flooring on 10-gauge cross members to support heavy loads. Call (1) 800 834-7692 or (1) 562 633 9951; e-mail roytruck@aol.com or visit www.royaltruckbody.com.

UP FRONT

Golden Harvest Seeds, Bloomington, Illinois, has published the 16-page magazine *Up Front*, which provides crop management information for corn and soybean producers. *Up Front* updates research efforts and gives the latest agronomic information and economic trends in the seed industry. The current issue covers narrow-row corn, corn rootworm tolerance and testing



THE UNITED STATES OF AMERICA

TO ALL TO WHOM THESE PRESENTS SHALL COME:

**Mississippi Agricultural & Forestry
Experiment Station**

Whereas, THERE HAS BEEN PRESENTED TO THE

Secretary of Agriculture

AN APPLICATION REQUESTING A CERTIFICATE OF PROTECTION FOR AN ALLEGED NOVEL VARIETY OF SEXUALLY REPRODUCED PLANT, THE NAME AND DESCRIPTION OF WHICH ARE CONTAINED IN THE APPLICATION AND EXHIBITS, A COPY OF WHICH IS HEREUNTO ANNEXED AND MADE A PART HEREOF, AND THE VARIOUS REQUIREMENTS OF LAW IN SUCH CASES MADE AND PROVIDED HAVE BEEN COMPLIED WITH, AND THE TITLE THERETO IS, FROM THE RECORDS OF THE PLANT VARIETY PROTECTION OFFICE, IN THE APPLICANT(S) INDICATED IN THE SAID COPY, AND WHEREAS, UPON DUE EXAMINATION MADE, THE SAID APPLICANT(S) IS (ARE) ADJUDGED TO BE ENTITLED TO A CERTIFICATE OF PLANT VARIETY PROTECTION UNDER THE LAW.

NOW, THEREFORE, THIS CERTIFICATE OF PLANT VARIETY PROTECTION IS TO GRANT UNTO THE SAID APPLICANT(S), AND THE SUCCESSORS, HEIRS OR ASSIGNS OF THE SAID APPLICANT(S) FOR THE TERM OF *eighteen* YEARS FROM THE DATE OF THIS GRANT, SUBJECT TO THE PAYMENT OF THE REQUIRED FEES AND PERIODIC REPLENISHMENT OF VIABLE BASIC SEED OF THE VARIETY IN A PUBLIC REPOSITORY AS PROVIDED BY LAW, THE RIGHT TO EXCLUDE OTHERS FROM SELLING THE VARIETY, OR OFFERING IT FOR SALE, OR REPRODUCING IT, OR IMPORTING IT, OR EXPORTING IT, OR USING IT IN PRODUCING A HYBRID OR DIFFERENT VARIETY THEREFROM, TO THE EXTENT PROVIDED BY THE PLANT VARIETY PROTECTION ACT.

THE UNITED STATES SEED OF THIS VARIETY (1) SHALL BE SOLD BY VARIETY NAME ONLY AS OF CERTIFIED SEED AND (2) SHALL CONFORM TO THE NUMBER OF GENERATIONS BY THE OWNER OF THE RIGHTS. (34 STAT. 1542, AS AMENDED, 7 U.S.C. 2121 ET SEQ.)

SOYBEAN

'Sharkey'

In Testimony Whereof, I have hereunto set
my hand and caused the seal of the Plant
Variety Protection Office to be affixed
at the City of Washington, D. C.
this 28th day of April in
the year of our Lord one thousand nine
hundred and eighty-nine.

Attest

Kenneth B. Evans
Commissioner
Plant Variety Protection Office
Agricultural Marketing Service

Clayton Yentler
Secretary of Agriculture

U.S. DEPARTMENT OF AGRICULTURE
 AGRICULTURAL MARKETING SERVICE
 LIVESTOCK, MEAT, GRAIN & SEED DIVISION
 PLANT VARIETY PROTECTION OFFICE
 BELTSVILLE, MARYLAND 20708

EXHIBIT C
 (Soybean)

OBJECTIVE DESCRIPTION OF VARIETY
 SOYBEAN (*Glycine max* L.)

NAME OF APPLICANT(S) Mississippi Agricultural and Forestry Experiment Station	TEMPORARY DESIGNATION D79-6162	VARIETY NAME Sharkei
ADDRESS (Street and No., or R.F.D. No., City, State, and Zip Code) Post Office Box 6311, Mississippi State, MS 39762		FOR OFFICIAL USE ONLY PVPO NUMBER 8800148

Choose the appropriate response which characterizes the variety in the features described below. When the number of significant digits in your answer is fewer than the number of boxes provided, place a zero in the first box when number is 9 or less (e.g.,).
 Scurred characters ***** are considered fundamental to an adequate soybean variety description. Other characters should be described when information is available.

1. SEED SHAPE:

<input checked="" type="checkbox"/> 2			
	1 = Spherical (L/W, L/T, and T/W ratios = < 1.2)	2 = Spherical Flattened (L/W ratio > 1.2; L/T ratio = < 1.2)	4 = Elongate Flattened (L/T ratio > 1.2; T/W > 1.2)
	3 = Elongate (L/T ratio > 1.2; T/W = < 1.2)		

2. SEED COAT COLOR: (Mature Seed)

7 1 = Yellow 2 = Green 3 = Brown 4 = Black 5 = Other (Specify) _____

3. SEED COAT LUSTER: (Mature Hard Shelled Seed)

1 1 = Dull ('Conroy 79'; 'Braxton') 2 = Shiny ('Nebooy'; 'Gayoy 17')

4. SEED SIZE: (Mature Seed)

75 Grams per 100 seeds

5. HILLUM COLOR: (Mature Seed)

2 1 = Buff 2 = Yellow 3 = Brown 4 = Gray 5 = Imperfect Black 6 = Black 7 = Other (Specify) _____

6. COTYLEDON COLOR: (Mature Seed)

7 1 = Yellow 2 = Green

7. SEED PROTEIN PEROXIDASE ACTIVITY:

1 = Low 2 = High

8. SEED PROTEIN ELECTROPHORETIC BAND:

1 = Type A (SP1^a) 2 = Type B (SP1^b)

9. HYPOCOTYL COLOR:

1 1 = Green only ('Evans'; 'Davis') 2 = Green with bronze band below cotyledons ('Woodworth'; 'Tracy')

3 = Light Purple below cotyledons ('Benson'; 'Pickett 71')

4 = Dark Purple extending to unifoliate leaves ('Hodgson'; 'Coker Hamon 266A')

10. LEAFLET SHAPE:

3 1 = Lancolate 2 = Oval 3 = Ovoid 4 = Other (Specify) _____

55

8900148

11. LEAFLET SIZE:

2

1 = Small ('Amoy 71'; 'AS312')
3 = Large ('Crawford'; 'Tracy')

2 = Medium ('Corsoy 79'; 'Gray 171')

12. LEAF COLOR:

3

1 = Light Green ('Weber'; 'York')
3 = Dark Green ('Gnome'; 'Tracy')

2 = Medium Green ('Corsoy 79'; 'Braxton')

★ 13. FLOWER COLOR:

1

1 = White

2 = Purple

3 = White with purple throat

★ 14. POD COLOR:

1

1 = Tan

2 = Brown

3 = Black

★ 15. PLANT PUBESCENCE COLOR:

2

1 = Gray

2 = Brown (Tawny)

16. PLANT TYPE:

3

1 = Sander ('Essex'; 'Amoy 71')
3 = Bushy ('Gnome'; 'Govan')

2 = Intermediate ('Amcor'; 'Braxton')

★ 17. PLANT HABIT:

1

1 = Determinate ('Gnome'; 'Braxton')

2 = Semi-Determinate ('Will')

3 = Indeterminate ('Nebosy'; 'Improved Pelican')

★ 18. MATURITY GROUP:

9

1 = 000
8 = VI

2 = 00
10 = VII

3 = 0
11 = VIII

4 = I
12 = IX

5 = II
13 = X

6 = III

7 = IV

8 = V

★ 19. DISEASE REACTION: (Enter 0 = Not Tested; 1 = Susceptible; 2 = Resistant)

BACTERIAL DISEASES:

2

Bacterial Pustule (*Xanthomonas phaseoli* var. *soyensis*)

0

Bacterial Blight (*Pseudomonas glycines*)

2

Wilt (*Pseudomonas tabaci*)

FUNGAL DISEASES:

0

Brown Spot (*Sclerotinia glycines*)

Frogeye Leaf Spot (*Cercospora soyniae*)

0

Race 1

0

Race 2

0

Race 3

0

Race 4

0

Race 5

0

Other (Specify)

0

Target Spot (*Corynespora cassiicola*)

0

Downy Mildew (*Peronospora infoliorum* var. *manihotis*)

0

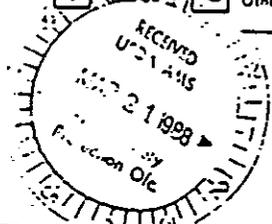
Powdery Mildew (*Microspora diffusa*)

0

Brown Stem Rot (*Cephusporium prostratum*)

2

Stem Canker (*Diaporthe phaseolorum* var. *cankvora*)



18. DISEASE REACTION: (Enter 0 = Not Tested; 1 = Susceptible; 2 = Resistant) (Continued)

FUNGAL DISEASES: (Continued)

- ★ 0 Pod and Stem Blight (*Diaporthe phaseolorum* var. *sojae*)
- 0 Purple Seed Stain (*Cercospora kikuchii*)
- 0 Rhizoctonia Root Rot (*Rhizoctonia solani*)
- Phytophthora Rot (Phytophthora megasperma* var. *sojae)*
- ★ 2 Race 1 2 Race 2 2 Race 3 2 Race 4 2 Race 5 2 Race 6 2 Race 7
- 2 Race 8 2 Race 9 2 Other (Specify) 10, 11, 13, 14, 15, 16, 17, 18

VIRAL DISEASES:

- 0 Bud Blight (Tobacco Ringspot Virus)
- 0 Yellow Mosaic (Bean Yellow Mosaic Virus)
- ★ 2 Chinese Mosaic (Cowpea Chlorotic Virus)
- 1 Pod Mottle (Bean Pod Mottle Virus)
- ★ 1 Seed Mottle (Soybean Mosaic Virus)

NEMATODE DISEASES:

- Soybean Cyst Nematode (*Heterodera glycines*)
- ★ 0 Race 1 0 Race 2 2 Race 3 1 Race 4 Other (Specify) _____
- 0 Lance Nematode (*Hoplitaimus Colymbus*)
- ★ 2 Southern Root Knot Nematode (*Meloidogyne incognita*)
- ★ 0 Northern Root Knot Nematode (*Meloidogyne Hapla*)
- 1 Peanut Root Knot Nematode (*Meloidogyne arvensis*)
- 2 Reniform Nematode (*Rotylemchulus reniformis*)
- OTHER DISEASE NOT ON FORM (Specify): _____

19. PHYSIOLOGICAL RESPONSES: (Enter 0 = Not Tested; 1 = Susceptible; 2 = Resistant)

- ★ 0 Iron Chlorosis on Calcareous Soil
- Other (Specify) _____

20. INSECT REACTION: (Enter 0 = Not Tested; 1 = Susceptible; 2 = Resistant)

- 1 Mexican Bean Beetle (*Epicauta varivestris*)
- 2 Peasie Leaf Hopper (*Empoasca fabae*)
- 1 Other (Specify) Soybean Looper

21. INDICATE WHICH VARIETY MOST CLOSELY RESEMBLES THAT SUBMITTED.

CHARACTER	NAME OF VARIETY	CHARACTER	NAME OF VARIETY
Plant Shape	<u>Fragy-M</u>	Seed Coat Luster	<u>Fragy-M</u>
Leaf Shape	"	Seed Size	"
Leaf Color	"	Seed Shape	"
Leaf Size	"	Seedling Pigmentation	"

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File on Jackson Variety of Annual Ryegrass

Attached is a complete file on the Jackson Variety of Annual Ryegrass (a forage crop) awarded Plant Variety Protection certificate in 1994. Most files are less detailed.

Remember:

- a. The exhibits are only to establish DUS;
- b. the exhibits (data etc) are provided by the applicant;
- c. the PVP office in the U.S. only *examines* the application and exhibits and then makes determination (as in case of patents); field tests or other data (DNA for example) are only used as a last resort.
- d. most European countries would do some field testing although the trend is definitively toward the applicant doing the work, i.e., as in the U.S. system.

Sincerely,
Curt Delouche



United States
Department of
Agriculture

Agricultural
Marketing
Service

Science
Division

Plant Variety Protection Office
NAL Building, Room 500
10301 Baltimore Blvd.
Beltsville, MD 20705-2351

February 16, 1994

CERTIFIED MAIL

Mr. Randy Vaughan, Manager
Foundation Seed Stocks
Box 6311
Mississippi State, MS 39762

Dear Mr. Vaughan:

SUBJECT: Certificate No. 8900327, RYEGRASS, ANNUAL, 'Jackson'

It is with great pleasure that I enclose the following U. S. Plant
Variety Protection Certificate:

8900327
RYEGRASS, ANNUAL
'Jackson'

Sincerely,

Kenneth H. Evans, Commissioner
Plant Variety Protection Office
Telephone: (301) 504-5518

Enclosure



The Agricultural Marketing Service
is an agency of the
United States Department of Agriculture

No.

8900327



THE UNITED STATES OF AMERICA

TO ALL TO WHOM THESE PRESENTS SHALL COME:

Mississippi Agricultural and Forestry
Experiment Station

Whereas, THERE HAS BEEN PRESENTED TO THE

Secretary of Agriculture

AN APPLICATION REQUESTING A CERTIFICATE OF PROTECTION FOR AN ALLEGED NOVEL VARIETY OF SEXUALLY REPRODUCED PLANT, THE NAME AND DESCRIPTION OF WHICH ARE CONTAINED IN THE APPLICATION AND EXHIBITS, A COPY OF WHICH IS HEREUNTO ANNEXED AND MADE A PART HEREOF, AND THE VARIOUS REQUIREMENTS OF LAW IN SUCH CASES MADE AND PROVIDED HAVE BEEN COMPLIED WITH, AND THE TITLE THERETO IS, FROM THE RECORDS OF THE PLANT VARIETY PROTECTION OFFICE, IN THE APPLICANT(S) INDICATED IN THE SAID COPY, AND WHEREAS, UPON DUE EXAMINATION MADE, THE SAID APPLICANT(S) IS (ARE) ADJUDGED TO BE ENTITLED TO A CERTIFICATE OF PLANT VARIETY PROTECTION UNDER THE LAW.

NOW, THEREFORE, THIS CERTIFICATE OF PLANT VARIETY PROTECTION IS TO GRANT UNTO THE SAID APPLICANT(S) AND THE SUCCESSORS, HEIRS OR ASSIGNS OF THE SAID APPLICANT(S) FOR THE TERM OF *eighteen* YEARS FROM THE DATE OF THIS GRANT, SUBJECT TO THE PAYMENT OF THE REQUIRED FEES AND PERIODIC REPLENISHMENT OF VIABLE BASIC SEED OF THE VARIETY IN A PUBLIC REPOSITORY AS PROVIDED BY LAW, THE RIGHT TO EXCLUDE OTHERS FROM SELLING THE VARIETY, OR OFFERING IT FOR SALE, OR REPRODUCING IT, IMPORTING IT, OR EXPORTING IT, OR USING IT IN PRODUCING A HYBRID OR DIFFERENT VARIETY THEREFROM, TO THE EXTENT PROVIDED BY THE PLANT VARIETY PROTECTION ACT (ACT OF OCTOBER 3, 1930, AS AMENDED, 7 U.S.C. 2321 ET SEQ.)

ANNUAL RYEGRASS

'Jackson'

In Testimony Whereof, I have hereunto set my hand and caused the seal of the Plant Variety Protection Office to be affixed at the City of Washington, D.C. this 30th day of December in the year of our Lord one thousand nine hundred and ninety-three.

Attest

Kenneth Hewson

Commissioner

Plant Variety Protection Office
Agricultural Marketing Service

Mike Egan
Secretary of Agriculture



Public reporting burden for this collection of information is estimated to average 30 minutes per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Department of Agriculture, Paperwork Reduction Project (0418-0055), Washington, DC 20250, and to the Office of Management and Budget, Paperwork Reduction Project (0418-0055), Washington, DC 20503.

U.S. DEPARTMENT OF AGRICULTURE
AGRICULTURAL MARKETING SERVICE

APPLICATION FOR PLANT VARIETY PROTECTION CERTIFICATE
(Instructions on reverse)

Applicant is required to agree to determine if a plant variety protection certificate is to be issued (7 U.S.C. 2427). Information is held confidential until certificate is issued (7 U.S.C. 2428).

1. NAME OF APPLICANT(S) (as it is to appear on the Certificate) Mississippi Agricultural & Forestry Experiment Station		2. TEMPORARY DESIGNATION OR EXPERIMENTAL NO. MSR-86-1	3. VARIETY NAME Jackson
4. ADDRESS (street and no., or R.F.D. no., city, state, and ZIP) Drawer ES Mississippi State, MS 39762		5. PHONE (include area code) (601) 325-3005	FOR OFFICIAL USE ONLY PVPO NUMBER 89C0327
6. GENUS AND SPECIES NAME Lolium multiflorum Lam.	7. FAMILY NAME (Botanical) Poaceae	8. DATE OF DETERMINATION Sept. 28, 1989	
9. CROP AND NAME (Common Name) Annual Ryegrass	10. IF THE APPLICANT NAMED IS NOT A "PERSON," GIVE FORM OF ORGANIZATION (Corporation, partnership, association, etc.) State Institution	11. IF INCORPORATED, GIVE STATE OF INCORPORATION	9. FILING AND EXAMINATION FEE \$250.00
12. DATE OF INCORPORATION		10. RECEIPTS Date Sept. 28, 1989 Time 2:00 PM	
13. NAME AND ADDRESS OF APPLICANT REPRESENTATIVE(S), IF ANY, TO SERVE IN THIS APPLICATION AND RECEIVE ALL PAPERS Dr. V. G. Hurt, Drawer ES, Mississippi State, MS 39762 (601) 325-3005 Mr. B. C. Keith, Box 6311, Mississippi State, MS 39762 (601) 325-2390		11. RECEIPTS Filing and Examination Fee \$250.00 Date August 6, 1993	

* NOTE: Please send all correspondence to Mr. B.C. Keith (address above)
Phone (include area code)

14. CHECK APPROPRIATE BOX FOR EACH ATTACHMENT SUBMITTED (Follow INSTRUCTIONS on reverse)

a. Exhibit A. Origin and Breeding History of the Variety.
b. Exhibit B. Novelty Statement.
c. Exhibit C. Objective Description of Variety.
d. Exhibit D. Additional Description of Variety.
e. Exhibit E. Statement of the Basis of Applicant's Ownership.
f. Seed Sample (2,500 viable untreated seeds). Date Seed Sample mailed to Plant Variety Protection Office 9/27/89
g. Filing and Examination Fee (\$2.150) made payable to "Treasurer of the United States."

15. DOES THE APPLICANT(S) SPECIFY THAT SEED OF THE VARIETY BE SOLD BY VARIETY NAME ONLY AS A CLASS OF CERTIFIED SEED? (See section 82(a) of the Plant Variety Protection Act.)
 YES (If "YES," answer items 16 and 17 below) NO (If "NO," skip to item 18 below)

16. DOES THE APPLICANT(S) SPECIFY THAT THIS VARIETY BE LIMITED AS TO NUMBER OF GENERATIONS?
 YES NO

17. IF "YES" TO ITEM 15, WHICH CLASS(S) OF PRODUCTION BEYOND BREEDER SEED?
 FOUNDATION REGISTERED CERTIFIED

18. DO THE APPLICANT(S) PREVIOUSLY FILE FOR PROTECTION OF THE VARIETY IN THE U.S.?
 YES (If "YES," answer Plant Variety Protection Act Patent Act Give date: _____)
 NO

19. HAS THE VARIETY BEEN RELEASED, USED, OFFERED FOR SALE, OR MARKETED IN THE U.S. OR OTHER COUNTRIES?
 YES (If "YES," give names of countries and dates)
 NO

20. The applicant(s) declares that a viable sample of basic seeds of this variety will be furnished with the application and will be replenished upon request in accordance with such regulations as may be applicable.
The undersigned applicant(s) is (are) the owner(s) of this sexually reproduced novel plant variety, and believes that the variety is distinct, uniform, and stable as required in section 41, and is entitled to protection under the provisions of section 42 of the Plant Variety Protection Act.
Applicant(s) is (are) informed that false representation herein can jeopardize protection and result in penalties.

SIGNATURE OF APPLICANT (OPTIONAL) <i>David G. Hurt</i>	CAPACITY OR TITLE Director, MAFES	DATE 9/21/89
SIGNATURE OF APPLICANT (OPTIONAL) <i>Bernice Keith</i>	CAPACITY OR TITLE MMS Foundation Seed	DATE 9/21/89

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EXHIBIT A

Origin and Breeding History of the Variety:

1. 'Jackson' is the result of three cycles of phenotypic recurrent selection for crown rust (caused by Puccinia coronata) resistance in a population of 'Marshall' annual ryegrass. Within each selection cycle, selections were made by artificially inoculating 6-8 week old seedlings with urediospores of P. coronata in the greenhouse and eliminating all seedlings which had developed rust symptoms 2 weeks after inoculation. This procedure was repeated two more times on the surviving genotypes to minimize disease escape. The survivors were then transferred to an isolation block in the field for seed increase. This cycle was repeated each year from 1983 to 1985. In addition to the greenhouse screening, the seed increase block was rogued for rusted plants prior to seed harvest each year.
2. Seed harvested in 1985 was increased for seed in 1986 to provide seed for subsequent cultivar evaluation trials. 'Jackson' was evaluated in two trials in 1986-87, 10 trials in 1987-88, and 21 trials in 1988-89.
3. Jackson annual ryegrass contains some non-fluorescent seedlings. These variants occur in 1-2% of the seedlings.
4. Attached data from regional cultivar evaluations indicate that varietal performance has been stable over the past 3 years. Supporting data are summarized in tables 1-7 and complete data are presented in Appendix A.

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EXHIBIT 8

Novelty Statement

'Jackson' most closely resembles 'Marshall' and 'Gulf'; however, 'Jackson' is highly resistant to crown rust while 'Marshall' is highly susceptible. 'Jackson' is highly cold tolerant whereas 'Gulf' is very susceptible to cold injury. 'Jackson' is approximately 8 days earlier than 'Marshall' and 8 days later than 'Gulf'.

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BEST AVAILABLE COPY

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Table 1. Crown rust resistance of three annual ryegrass cultivars, by location and year.

Location	Year	Crown Rust Resistance Rating			Scale *
		Jackson	Marshall	Gulf	
Miss. State, MS	1989	1.3	3.3	1.4	1-8
	1989	18.7	91.7	27.1	0-100 +
Raymond, MS	1987	1.3	5.5	2.3	1-9
	5-02-89	1.0	3.0	2.0	1-5
	6-02-89	1.2	6.0	5.2	0-100 ++
Poplarville, MS	1989	1.25	3.75	1.00	1-5
Angleton, TX	1988	0.2	2.7	0.2	0-10
	1989	10.0	80.0	17.5	0-100 ++
Gainesville, FL	1989	3.0	7.5	3.8	0-10
Jay, FL	1989	0.3	3.0	---	0-10
Jeanerette, LA	1989	2.0	32.0	0.0	0-100 ++

* The lower value indicates the higher level of rust resistance in all cases.
 + Percentage of plants which were showing rust symptoms.
 ++ Percentage of leaf area affected.

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Table 2. Relative maturities of three annual ryegrass cultivars.

Location	Year	Trait	Cultivar		
			Jackson	Marshall	Gulf
Miss. State, MS	88-89	Anthesis Date	123.7	132.0	118.8
Gainesville, FL	1989	50% Bloom Date	104	117	97
Princeton, KY	5-19-88	Maturity Rating *	9.0	7.0	---
Spindletop, KY	5-16-88	Maturity Rating *	10.0	5.5	---

* 1 = vegetative, 15 = mature seed.

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Table 4. Cold Tolerance ratings of annual ryegrass cultivars, 1989.

Cultivar	Cold Tolerance Rating	
	Raymond, MS *	Overton, TX **
Jackson	3	2
Marshall	2	1
Gulf	4	6
Surrey	3	4
Multimo	2	—
Tetrone	3	—
HI 124	2	—
Florida 80	4	3
Penploid	4	4
Max	3	4
Comet	3	4
Tetragold	3	—
Bulldog	3	3
Major	4	—
Rustmaster	4	—
Nutriblend	3	—
LW 1871	3	—
Magnolia	4	6
WVPB-88-AR-2	3	4
LSD (.05)	1	

* 1 = no visible damage , 5 = plants dead.

** 1 = little damage , 9 = complete freeze back of tissue.

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Table 8. Floral characteristics of four annual ryegrass cultivars.
Mississippi State, MS, 1988.

Cultivar	Spikelets/Spike	Florets/Spikelet
Jackson	30.8	15.8
Marshall	32.4	15.8
Gulf	28.8	16.7
Surrey	30.9	14.8
LSD (.05)	1.9	0.5

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Table 7. Percentage of Fluorescent seed in two lots of Jackson as determined by three independent laboratories (100% pure live seed basis).

Seed Lot	Laboratory		
	Arkansas	Mississippi	Oregon
1988-A	99.7	98.8	99.5
1988-B	99.4	98.4	100.0

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//

1980327

Ryegrass - Raymond

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Variety	Dry Matter Yield						Total	Rust Rating* 5-29-87
	Harvest Dates							
	11-10-86	12-2-86	3-10-87	4-2-87	5-4-87	6-2-87		
	lb/A							
Marshall	734	540	1,512	1,654	1,042	375	5,857	5.5
Gulf	805	596	2,093	924	779	267	5,464	2.3
Florida 80	402	436	2,093	775	1,004	530	5,240	1.5
FL-X-1986LR	446	502	941	1,798	1,084	561	5,332	2.3
TX-R-84-1	474	669	843	1,277	1,140	564	4,967	3.0
TX-R-85-1	270	603	1,590	1,014	850	329	4,656	2.8
TX-R-85-2	603	786	1,687	1,073	1,120	469	5,738	1.8
Westerploid 777	523	563	1,732	1,450	711	197	5,176	5.5
Lunar Tetraploid	702	481	1,340	1,350	605	321	4,799	6.0
MSR 86-1	376	594	1,859	1,241	1,150	518	5,738	1.3
Cervus	516	448	1,511	1,685	915	584	5,659	3.3
Dama	833	605	1,375	1,952	941	469	6,175	3.5
Urbana	681	568	885	1,833	1,047	533	5,547	6.8
Torero	836	601	1,460	1,471	871	530	5,769	7.0
Tandem Festulolium	477	704	1,882	1,966	1,101	1,223	7,353	1.5
L-FAR-1	516	681	2,216	1,368	1,106	472	6,359	5.5
Caramba	932	549	1,221	1,479	878	437	5,496	6.3
Multimo	756	556	910	1,763	1,152	486	5,623	7.5
MOM LM 457	580	685	2,016	1,983	1,171	643	7,078	5.0
MOM LM 455	700	695	784	1,950	1,582	603	6,314	5.5
Magnolia	1,092	594	885	1,774	924	439	5,708	3.8
HHH	357	610	2,455	1,042	924	436	5,824	1.5
Mean	619	594	1,545	1,492	1,004	499	5,753	
LSD (.05)	405	NS	1,160	425	349	326	1,527	
Seeding Rate	35 lb/A							
Planting Date	9-22-86							
Fertilization	60-60-60		9-15-86		60-0-0			3-4-87

* Rust Rating
1 = Least
9 = Most

Ryegrass - Raymond

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Rust
ng*
-87
5.5
2.3
3
3
5.0
2.8
3
3
5
5
0
5

Variety	Cold Injury ¹ 3-2-89	Crown Rust ² 6-2-89
Marshall	2	--X--
Gulf	4	6.2
MSR 86-1	3	5.2
Multimo	2	1.2
Tetrone	3	3.8
HI 124	2	1.4
Florida 80	4	8.6
Surrey	3	2.3
Penploid	4	3.6
Max	3	7.2
Comet	3	4.8
Tetragold	3	7.5
Bulldog	3	3.4
Major	4	6.0
Rustmaster	4	9.5
Nutriblend	3	0.7
LW 1871	3	4.3
Magnolia	4	3.7
WVPB-88-AR-2	3	0.2
Overall Mean	3.1	
LSD (.05)	.5	4.2
Standard Error of Mean	.2	3.0
Error Degrees of Freedom	57	157
CV %	11	22

Seeding Rate 30 lb/A
Planting Date 9-27-88
Fertilization 60-26-52 At Planting
68-0-0 1-24-89
34-0-0 4-17-89

¹Cold Injury 1 = None
5 = Severe

²Crown Rust Percent of Leaf Area Affected

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Dry matter production and crown rust rating of annual ryegrass varieties for 1987-88 season at Angleton, Texas.

Cultivar	18 Dec.	23 Feb.	18 Apr.	24 May	Total	Crown rust rating
TX-R-85-2 ^{a/}	978	2316	4495	436	8224	0.7 ^{b/}
Marshall	1111	2099	4353	385	7947	2.7
HHH	955	1914	4464	535	7868	0.2
Florida 80	931	2037	4110	412	7490	0.7
FL-LR	933	2222	3801	488	7444	1.7
TX-R-86-1	923	1858	4112	447	7339	0.7
TX-R-86-2-L	1020	2183	3670	443	7316	0.2
MSR-86-1	886	1949	4014	456	7305	0.2
NF-32	849	2186	3626	441	7102	2.0
Tetragold	783	2029	3039	369	7020	1.7
NF-2	709	2228	3655	382	6973	0.5
TX-R-85-1	917	1777	3822	341	6856	0.2
TX-R-87-Bulk	846	1890	3773	345	6854	0.5
Tetra common	1036	2218	3091	452	6796	6.7
Bulldog	1074	1915	3455	321	6764	1.2
Gulf	898	1859	3640	294	6690	0.2
Comet	897	2195	3059	487	6637	7.7
TX-R-84-1	759	1713	3843	272	6586	0
Dama	675	2148	3141	368	6332	0.7
Urbana	838	2069	2792	347	6047	4.7
Max	833	1966	2823	338	5959	3.2
LD 05	218	492	534	208	751	

Planted on October 5, 1987. Seeding rate was 30 lbs/a.

Preplant fertilizer: 60 lbs/a of N and P₂O₅, and 15 lbs/a of K₂O.
 Topdressed: 50 lbs N/a on January 25 and February 24.

^{a/} TX lines are experimental breeding lines being evaluated and are presently not available to growers.

^{b/} Crown rust rating, 1 = 10%, 2 = 20%, etc. (Mean of 4 replications).

000027

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U.S. DEPARTMENT OF AGRICULTURE
 AGRICULTURAL MARKETING SERVICE
 LIVESTOCK, MEAT, GRAIN AND SEED DIVISION
 BELTSVILLE, MARYLAND 20708
OBJECTIVE DESCRIPTION OF CULTIVARS
 RYEGRASS
 (Lolium spp.)

EXHIBIT C
 5/27/67

NAME OF APPLICANT(S) Mississippi Agricultural & Forestry Experiment Station	VARIETY NAME OR TEMPORARY DESIGNATION Jackson
ADDRESS (Street and No., or R.F.D. No., City, State, and ZIP Code) Drawer 23 Mississippi State, MS. 39762	FOR OFFICIAL USE ONLY PVPO NUMBER 7900327

Place the appropriate number that describes the general character of this variety in the boxes below: Place a zero in first box (e.g. 0100) or 0010 when number is either 99 or less or 9 or less. Descriptions of characters should represent those that are typical for the variety. Ranges may be given also. Measured data should be for SPACED PLANTS. Give additional description for all characteristics that cannot be adequately described in the form below. Append all pertinent comparative trial and evaluation data. The symbol "A" indicates decimal.

1. SPECIES:
 1 = L. MULTIFLORUM (annual or biennial; includes Winterwonder) 2 = L. PERENNE (perennial) 3 = L. RIGIDUM (includes Winterwonder)
 4 = HYBRID (of species) 5 = OTHER (Specify):

2. PLOIDY:
 1 = DIPLOID 2 = TETRAPLOID 3 = OTHER (Specify):

3. DURATION:
 1 = ANNUAL OR BIENNIAL 2 = SHORT LIVED PERENNIAL (3-4 years) 3 = PERENNIAL (more than 4 years)

STANDARD CULTIVARS
 1 = GULF 2 = WIMMERA 82 3 = LINN 4 = PELO
 5 = NORLEA 6 = ABERYSTWYTH S-23 7 = MANHATTAN 8 = PENNSYLVANIA

4. MATURITY (50% HEADED) Use standards from above for comparison:
 1 = VERY EARLY 3 = EARLY DAYS EARLIER THAN STANDARD CULTIVAR
 5 = MEDIUM 7 = LATE 0 6 DAYS LATER THAN STANDARD CULTIVAR
 9 = VERY LATE

5. MATURE PLANT HEIGHT (Use standard cultivars from above):
 CM. HIGH CM. SHORTER THAN STANDARD CULTIVAR
 CM. TALLER THAN STANDARD CULTIVAR

6. PERCENT WINTER DAMAGE (estimated as percent of the area appearing dead). Use standard cultivars from above for comparison:
 0 1 0 PERCENT DAMAGE OF APPLICATION CULTIVAR
 0 9 0 PERCENT DAMAGE OF STANDARD CULTIVAR

7. TURF DENSITY Use standard cultivars from above:
 TILLERS PER 100 SQ. CM.
 FEWER TILLERS PER 100 SQ. CM. THAN STANDARD CULTIVAR
 MORE TILLERS PER 100 SQ. CM. THAN STANDARD CULTIVAR

8. FLAG LEAF (at full growth) Use standard cultivars from above:
 CM. LENGTH (from ligule to tip) MM. WIDTH (at widest point)
 CM. SHORTER THAN STANDARD CULTIVAR FLAG LEAF AT 1 = REFLEXED
 CM. LONGER THAN STANDARD CULTIVAR 2 = HORIZONTAL
 MM. NARROWER THAN STANDARD CULTIVAR 3 = SEMI-RECT
 MM. WIDER THAN STANDARD CULTIVAR 4 = RECT

Crown rust rating, 1 = 10%, 2 = 20%, etc. (Mean of 4 replications).

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R901 227

STANDARD CULTIVARS

1 = GULF	2 = WIMMERA 67	3 = UMN	4 = PELO
5 = MORLEY	6 = ABERYSTWYTH S-23	7 = MANHATTAN	8 = PENNSYLV

9. LEAVES:

1 = LEAVES ROLLED IN YOUNG SHOOTS

2 = LEAVES SEMI-ROLLED (Florets with rounded edges)

3 = LEAVES FOLDED IN YOUNG SHOOTS

1 VERNATION:

% PLANTS WITH ANTHOCYANIN IN LOWER LEAF SHEATH

2 FOLIAGE COLOR:

1 = YELLOW GREEN
2 = MEDIUM GREEN
3 = BLUE GREEN

10. SPIKE:

MM. SPIKE LENGTH (110 to 140 mm below lowest floret)

MM. SHORTER THAN

MM. LONGER THAN

MG. PER TEN SPIKES (100 to 140 mg below lowest floret)

MG. LIGHTER PER TEN SPIKES THAN

MG. HEAVIER PER TEN SPIKES THAN

1 6 FLORETS PER SPIKULET

PERCENTAGE OF PLANTS WITH:

RACHIS: % SMOOTH % ROUGH

SPIKE COLOR: % GREEN % PURPLE

LEMMA: 098- % AWNED. 003- 7 MM. AWN LENGTH

07- 0 MM. GLUME LENGTH

1 = SPIKULET LENGTH NEARLY EQUAL TO OUTER GLUMES
2 = SPIKULET LENGTH MUCH LONGER THAN OUTER GLUMES

11. COLEOPTILE:

% PLANTS WITH ANTHOCYANIN IN COLEOPTILE

12. ANTHOR COLOR:

0 % PLANTS WITH WHITE ANTHERS 1 0 0 % PLANTS WITH YELLOW ANTHERS

0 % PLANTS WITH PURPLE ANTHERS

13. ROOT AND PLANT CHARACTERS:

0 % PLANTS WITH PROSTRATE GROWTH HABIT 0 9 9 % PLANTS WITH FLUORESCENT ROOTS

1 0 0 % PLANTS WITH UPRIGHT GROWTH HABIT

14. SEED:

2 0 0 0 MG. PER 1,000 SEED 0 6 0 MM. TOTAL LENGTH OF 10 SEEDS 0 1 1 MM. TOTAL WIDTH OF TEN SEEDS

16

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Table 3. Crown rust (CR) and Helminthosporium (Helm.) disease ratings** for natural disease infestations of 20 (annual ryegrass) cultivars and experimental genotypes at Gainesville, FL in 1988-89 growing season.

Ryegrass genotypes	Crown rust ratings (seed crop)					50% bloom (mo-da)	Disease ratings Apr 24 on regrowth after Mar 6	
	Feb 9	Feb 17	Mar 6	Mar 29	Apr 14		Helm.	CR
TXR-87	0.6	1.8	2.5	3.4	4.8	4-11	3.4	5.1
TXR-85-1	0.4	1.5	1.9	2.8	3.8	4-10	3.4	5.2
TXR-85-2	0.6	1.8	2.1	2.9	3.5	4-11	3.8	4.4
TXR-86-1	0.8	1.4	2.1	2.4	3.2	4-11	3.9	4.6
TXR-86-2-1	1.0	1.8	2.5	3.3	4.0	4-13	2.6	4.0
Marshall	3.0	4.4	4.9	6.5	7.5	4-27*	3.1	7.5
Gulf	0.6	1.5	2.0	2.8	3.8	4-7	3.6	3.9
Fla 80	0.5	1.4	2.1	2.8	3.1	4-7	3.6	2.8
FL X1985 LR	0.4	1.1	1.8	2.9	3.6	4-4	3.3	3.5
Surrey	0.5	1.4	2.0	2.5	3.1	4-16	2.9	2.9
FL X1987 LR	0.4	1.4	1.9	2.1	2.8	4-13	2.6	2.6
MRS 86-1	0.5	1.5	2.0	2.4	3.0	4-16	3.6	3.2
NK tetrablend 444	0.5	1.3	1.5	2.1	3.1	4-14	3.6	3.5
GA reseeding	2.8	4.8	4.0	6.1	7.4	4-9	3.3	8.8
Magnolia	1.1	2.6	3.0	3.9	6.1	3-29	3.4	5.6
Elumaria	2.9	4.6	3.3	4.4	6.0	3-15	3.3	6.8
NK HW-1	0.5	1.1	1.5	2.4	3.3	4-29*	3.8	4.4
HUM 87-1	1.4	2.6	2.4	3.0	4.1	4-7	3.6	5.5
Common	0.5	1.3	2.0	2.9	4.0	4-6	4.0	4.9
Concord "ARG"	0.5	1.6	2.1	2.6	3.3	>5-4*	3.0	3.1

* Lots of unvernalized plants made bloom estimation difficult.

** Disease ratings: 0 - none to 10 - shoot completely covered with disease spots. Data reported is mean of 4 replications. Some crown rust noted as early as January 10; unusually heavy Helminthosporium occurred in April.

Rust nursery consisted of 4 replications of single row plots 16 ft long and 2 feet between rows seeded October 25, 1988. Two-thirds of each plot was mown to 1 inch height following March 6 rust rating and allowed to regrow. The uncut plants matured normally to get evaluation of 50% bloom and disease ratings on seed crop.

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Table 2. Crown rust ratings of annual ryegrass cultivars, Mississippi State, MS 1989.

Cultivar	Crown Rust Resistance	
	Intensity Rating *	Incidence **
MSR-86-1	1.27	18.75
Marshall	3.27	91.87
Gulf	1.42	27.08
FL-X-1986LR	1.54	31.25
LSD (.05)	0.35	19.38

* 1 = no rust ; 6 = severe rust.
 ** Percentage of plants showing rust symptoms.

CHP2:rb13

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Table 1. Relative maturity dates of annual ryegrass cultivars, Mississippi State, MS, 1988-89.

Cultivar	Anthesis Date		Mean
	1988	1989	
MSR-86-1	123.8	123.7	123.7
Marshall	129.6	134.4	132.0
Gulf	118.5	118.7	118.6
FL-X-1988LR	124.1	119.8	121.8
LSD (.05)	2.0	2.2	1.5

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Table 3. Floral characteristics of four annual ryegrass cultivars, Mississippi State, MS, 1988.

Cultivar	Spikelets/spike	Florets/Spikelet
MSR-88-1	30.8	15.8
Marshall	32.4	15.8
Gulf	28.8	16.7
FL-X-1988LR	30.9	14.8
LSD (.05)	1.9	0.5

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1987 RYEGRASS TRIAL SPINOLETOP MATURITY 06-16-88
 1-VEGETATIVE 16-MATURE SEED
 Minimum Significant Difference = 1.7548
 Means with the same letter are not significantly different.

Waller Grouping	Mean	N	LINE
A	16.000	4	JSCOTWI
A	16.000	4	SAKURAWA
A	14.000	4	FLA80
A	13.000	4	TXR861
B	13.000	4	PENNPLOI
B	11.000	4	TXR861
B	10.000	4	MSR861
B	8.500	4	TXR862L
B	7.500	4	WILO
B	6.500	4	FLA86LR
B	6.500	4	TETRAGOL
B	6.500	4	TETRONE
B	6.500	4	MARSHALL
B	5.500	4	MAX
B	5.500	4	ACE
B	6.000	4	BILLIKEN
B	6.000	4	COMET
B	5.000	1	CERVU
B	5.000	4	BILLION
B	6.000	3	CERUS
B	4.500	4	CARAMBA
B	4.500	4	MINARET
B	3.500	4	DALTIA
B	3.000	4	LM167

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1987 RYEGRASS VARIETY TRIAL % SEED HEADS 08-13-88
 Minimum Significant Difference = 17.09
 Means with the same letter are not significantly different.

Waller Grouping	Mean	N	LINE
A	99.000	3	FLA86LR
A	99.000	3	MSR861
A	99.000	1	TXR862L
A	94.333	3	MARSHALL
B	37.500	2	MAX
B	30.000	3	MINARET
B	26.000	2	TETRONE
B	25.000	1	CERVU
C	15.000	3	TETRAGOL
C	13.500	2	ACE
C	5.000	3	LM167
C	5.000	1	CERUS
C	6.000	3	WILO
C	1.000	3	DALTIA

10-10527

1987 RYEGRASS TRIAL PRINCETON MATURITY 06-19-88
 1=VEGETATIVE 15=MATURE SEED
 Minimum Significant Difference= 2.1043
 Means with the same letter are not significantly different.

Waller Grouping	Mean	N	LINE
	15.000	4	SAKURAWA
	15.000	4	PENNPLOI
	14.000	4	JSCOTW1
	13.500	4	FLASO
B	13.000	4	TXR881
B	11.000	4	TXR882L
	10.500	4	TXR881
	10.000	4	FLAS8LR
D	9.500	4	WILO
D	9.000	1	TETREAGO
D	9.000	4	MSR881
D	8.333	3	TETRAGOL
H	7.500	4	CERUS
H	7.000	4	MARSHALL
H	6.500	4	MINARET
H	6.500	4	TETRONE
H	6.000	4	BILLIKEN
H	5.500	4	ACE
H	5.500	4	COMET
	5.000	4	BILLION
	5.000	4	MAX
	4.500	4	DALTIA
	4.500	4	CARAMBA
	4.000	4	LM187

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1987 RYEGRASS TRIAL PRINCETON MATURITY 06-19-88

1000027

Ryegrass - Poplarville

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Variety	Dry Matter Yield					Total	Crown ¹ Rust
	Harvest Dates						
	12-6-88	1-16-89	2-27-89	4-6-89	5-2-89		
	-lb/A-						
Marshall	588	392	248	531	357	2,117	3.75
Gulf	670	674	373	755	376	2,847	1.00
MSR 86-1	359	441	388	1,012	488	2,689	1.25
Multimo	703	502	232	326	263	2,027	2.00
Tetrone	294	270	124	189	188	1,064	1.50
HI 124	474	294	155	292	338	1,553	3.50
Florida 80	637	466	432	909	395	2,841	1.00
Surrey	882	441	295	652	470	2,740	1.00
Penplod	637	637	419	1,046	413	3,153	1.00
Max	408	404	202	343	188	1,546	2.00
Comet	768	600	419	566	338	2,691	3.25
Tetragold	654	478	295	446	282	2,154	1.50
Buildog	703	429	310	703	470	2,615	1.50
Major	703	478	248	377	263	2,069	3.50
Rustmaster	588	478	310	841	413	2,630	1.25
Nutriblend	507	417	326	875	357	2,481	1.25
LW 1871	621	429	341	498	282	2,170	2.75
Magnolia	425	478	310	806	301	2,320	1.00
WVPB-88-AR-2	605	319	233	566	507	2,229	1.00
Beef Builder	686	736	373	772	395	2,961	1.25
Overall Mean	596	468	302	625	354	2,345	1.81
LSD (.05)	359	241	194	344	167	1,060	0.95
Standard Error of Mean	127	85	68	121	52	374	0.22
Error Degrees of Freedom	57	57	57	57	57	57	57
CV I	43	36	45	39	29	32	37
Seeding Rate	35 lb/A						
Planting Date	10-12-88						
Fertilization	68-0-0	At Planting					
	68-0-0	2-1-89					
	68-0-0	4-1-89					

¹Crown Rust 1 - None
5 - Severe

Ryegrass - Poplarville

Variety	Dry Matter Yield			3 Year Average
	Harvest Years			
	1986-87	1987-88	1988-89	
	-lb/A-			
Marshall	4,146	3,271	2,117	3,178
Gulf	5,086	4,237	2,847	4,057
Florida 80	4,070	4,009	2,841	3,640
Surrey	4,875	4,486	2,630	3,997
Multimo	5,031	3,091	2,027	3,383
Magnolia	5,396	4,121	2,320	3,946
Rustmaster	4,650	3,496	2,630	3,592

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Dry matter production and rust ratings of annual ryegrass varieties at Angleton 1988-89.

Variety	15 Feb.	3 Apr.	11 May	Total	2 May
----- Dry matter lb/A -----					
LM-K-1	2046	1847	1881	5774	20.0
LM-AR-2	2031	1774	1895	5700	12.5
Penploid	2383	1708	1567	5658	15.0
TXR-86-1	2161	1821	1634	5616	20.0
TXR-85-2	2102	1761	1733	5596	22.5
Gulf	2457	1564	1561	5582	17.5
Tetraploid 1	2302	1686	1589	5577	22.5
LM-AR-42	2057	1717	1787	5561	17.5
TXR-88-1	2020	1778	1722	5520	22.5
ETCO-9-88	2361	1568	1584	5513	17.5
TXR-87-BULK	1991	1679	1835	5505	30.0
Alamo	2235	1641	1613	5489	17.5
Florida-86LR	2079	1724	1644	5467	17.5
TXR-86-2-L	1995	1712	1739	5446	27.5
Florida 80	2113	1677	157	5347	15.0
TXR-85-1	2039	1627	1666	5332	25.0
MSR-86-1	2083	1564	1675	5322	10.0
LM-AR-22	2005	1611	1628	5244	32.5
TXR-84-1	1950	1554	1630	5134	27.5
Magnolia	2035	1569	1510	5114	15.0
FPR-P41	2054	1490	1538	5082	52.5
LM-AR-P44	1876	1577	1592	5045	30.0
Bulldog	1872	1417	1518	4807	40.0
HF-2	1717	1378	1555	4650	47.5
Marshall	1421	1501	1500	4422	80.0
WVFB-88-AR-601	1713	1308	1350	4371	72.5
Penngrazer fescue	1210	1360	1797	4367	22.5
HF-149	1461	1313	1504	4278	50.0
Max	1702	1382	981	4065	87.5
LM-3-7T	1410	1290	1298	3998	65.0
Aubade	1443	1132	920	3495	72.5
Coml	1084	988	716	2788	87.5
LSD.05	328	248	219	504	8.0

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87

Crown Rust	
17	3.75
	1.00
	1.25
27	2.00
54	1.50
	3.50
	1.00
	1.00
3	1.00
6	2.00
	3.25
	1.50
5	1.50
9	3.50
	1.25
	1.25
	2.75
	1.00
	1.00
	1.25
	1.81
	0.95
	0.22
57	
37	
None	
Severe	

Year Average
3,178
4,057
1,640
1,997
3,383
2,946
1,592

170327

Table . Ryegrass cultivar, seeding-rate, and times-of-harvest trial. AREC, Jay. 1988-89.

Entry	Seed lb./acre	Rust† 7 Apr.	Yield of oven-dry matter					Total
			Pounds per acres					
			17 Jan.	16 Feb.	20 Mar.	17 Apr.	17 May	
Fla. 80§	20	1.3	---	---	---	7870	1490	9360
Surrey	20	0.5	2010	1010	2040	2700	960	8720
MSR 86-1	20	0.3	1840	720	2020	3110	970	8660
Fla. 80	60	0.8	2230	1040	1950	2540	750	8510
Marshall	60	2.8	2400	1040	1790	2450	720	8400
Marshall	80	3.3	2490	1040	1970	2150	750	8400
Marshall	40	3.3	2470	900	2080	2210	650	8310
Fla. 80	40	0.3	2180	900	1590	2870	650	8190
Marshall	20	3.0	2000	910	2050	2430	730	8120
Fla. 80	80	0.8	2550	780	1530	2360	700	7920
Fla. 80	20	0.5	1790	680	1980	2190	980	7620
Marshall§	20	6.5	---	---	---	4900	1010	5910
LSD (c .05)	---	1.1	420	N.S.	N.S.	790	380	920

†0 = no rust; 10 = complete coverage.

‡Pounds per acre X 1.12 = kilograms per hectare.

§Harvested only two times.

PLANTED: October 14, 1988.

SOIL: Orangeburg sandy loam (Typic Paleudult).

FERTILIZER: 250 pounds per acre of 8-24-24 on 12 Oct. 88; 100 pounds per acre of ammonium nitrate on 7 Dec. 88, 24 Jan. 89, 27 Feb. 89, and 27 Mar. 89.

28

3527

40
 Ctrial. AREC, Jay.

17 New Total

1490	9360
960	8720
970	8660
750	8510
720	8400
750	8400
650	8310
650	8190
730	8120
700	7920
980	7620
1010	5910
380	920

9 per acre
 and 27

Table 21. Performance of ryegrass varieties at Iberia Research Station, Jeanerette, LA., 1989.

Entry	Dry Forage Yield			Total	Rust %
	Feb. 1	Apr. 4	Apr. 28		
	-----lbs/acre-----				
Rustmaster	6740	2910	1100	10,740	7
Magnolia*	6970	2510	930	10,400	0
Surrey	6580	2670	1120	10,360	2
Major	7080	2300	870	10,250	22
Nutriblend*	6410	2740	990	10,150	15
Florida 80*	6730	2210	1020	9,960	3
MSR 86-1	6660	2220	1030	9,910	2
Gulf*	6400	2540	900	9,830	0
Totrablend 444*	6160	2660	970	9,800	0
BAR LW A-UC	6460	1690	1120	9,270	15
Marshall*	6230	1690	1200	9,120	32
Dalita	6530	1630	930	9,090	32
Multimo*	6010	1740	1170	8,920	50
Tetrone	6200	1340	1150	8,690	22
BAR LM 8A	6400	1100	1060	8,560	25
Barmultra	5820	1130	1180	8,120	23
Mean	6460	2070	1050	9,570	16
LSD 0.05	NS	970	NS	NS	11

Rust ratings taken on April 28, 1989.
 * Recommended varieties
 Planted 11/1/88 on a Iberia silty clay soil.

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3527

30

89

1527

EXHIBIT E

Originality and Ownership

'Jackson' Annual Ryegrass was developed by Clarence E Watson of the Department of Agronomy. It is therefore a new variety that originated in the greenhouse, field plots, and the labs of the Mississippi Agricultural and Forestry Experiment Station. The Mississippi Agricultural and Forestry Experiment Station is the employer of Clarence E. Watson, ownership of 'Jackson' Annual Ryegrass remains with the employer.