ARAB REPUBLIC OF EGYPT
MINISTRY OF AGRICULTURE & LAND RECLAMATION
NATIONAL AGRICULTURAL RESEARCH PROJECT

ROGUING SEED PRODUCTION FIELDS

NARP Publication No. 40
Published: October, 1990

National Agricultural Research Project (NARP)
Agricultural Research Center

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A manual of procedures
to help ensure uniformly high seed quality
and reduce seed production costs

prepared by

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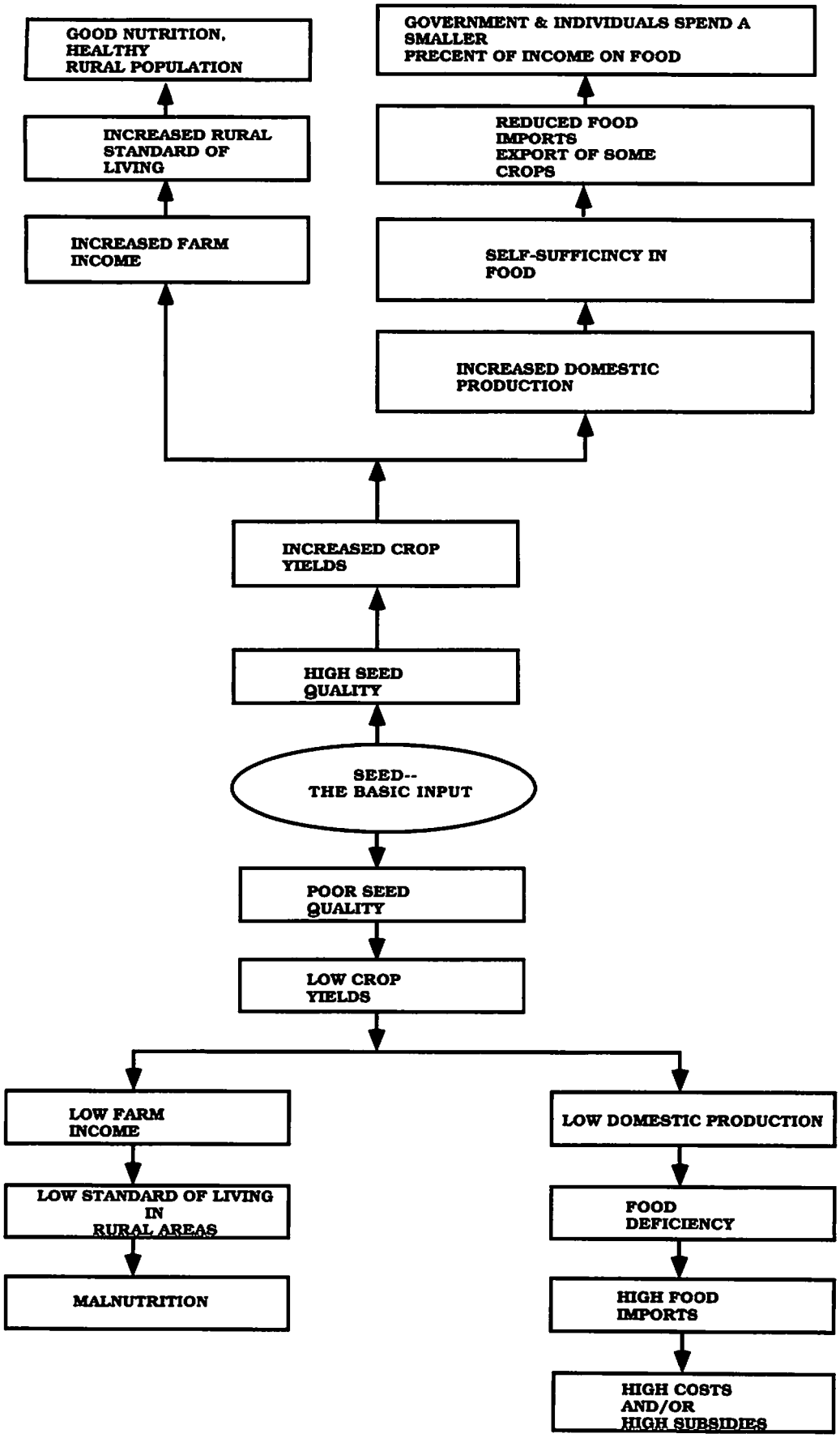
GOOD NUTRITION, HEALTHY RURAL POPULATION
INCREASED RURAL STANDARD OF LIVING
INCREASED FARM INCOME
GOVERNMENT & INDIVIDUALS SPEND A SMALLER PRECENT OF INCOME ON FOOD
REDUCED FOOD IMPORTS EXPORT OF SOME CROPS
SELF-SUFFICINCY IN FOOD
INCREASED DOMESTIC PRODUCTION
INCREASED CROP YIELDS
HIGH SEED QUALITY
SEED-- THE BASIC INPUT
POOR SEED QUALITY
LOW CROP YIELDS
LOW FARM INCOME
LOW STANDARD OF LIVING IN RURAL AREAS
MALNUTRITION
LOW DOMESTIC PRODUCTION
FOOD DEFICIENCY
HIGH FOOD IMPORTS
HIGH COSTS AND/OR HIGH SUBSIDIES

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ROGUING SEED PRODUCTION FIELDS

to help keep seed pure enough to transfer
improved higher-yielding technology
to Egyptian farmers

Genetic purity Of Seed

New varieties created by plant breeders carry genetic combinations which can give farmers crop plants of improved, superior varieties with agronomic or morphological characteristics which not only distinguish them from other varieties but also give better resistance to diseases, higher yields, improved crop quality, more efficient plant height, better drought resistance and/or water use, and other improvements which are controlled genetically. These improvements are transferred to farmers' fields and help increase yields **only** if the entire population of crop plants in all generations of seed production is maintained genetically pure so the seed is uncontaminated, and finally reaches farmers in genetically pure conditon.

The work of the plant breeder helps farmers produce more and better crops **only** if farmers receive genetically-pure seed of the improved varieties. If farmers' seed is contaminated by, or mixed with, seed of other varieties or offtype plants, they cannot get the benefits of improved varieties, and may suffer losses from disease, low yield, etc., caused by the contaminants.

Physical Purity of Seed

Physical purity of seed is important; if the seed lot contains much trash, farmers must plant higher rates of "seed", and still get poor, irregular stands. If the seed lot contains undesirable seed—weeds, other crops, etc.—it will produce undesirable plants which compete with crop plants, reduce yields, and lower the quality and value of the crop produced.

Preventing Contamination of Seed

Genetic and physical purity must be protected in all operations of seed production and supply; if one operation or phase is not done at the proper time or is poorly done, the seed will be of lower quality and yield potential.. Seed production in the field is one of the most important phases; managing seed fields must include specific measures which ensure seed purity:

A. Before planting the seed production field:

1. Select land which is free of volunteer plants, troublesome weeds, soilborne diseases and pests, etc.
2. Use only genetically-pure planting seed.
3. Verify that the seed field will have proper isolation.
4. Apply herbicides and/or cultivate the field to destroy undesirable weed and crop plants.

B. When the seed field is planted:

1. Before using them, clean the planter and any other equipment to remove any leftover seed/plants of other crops or varieties.

2. Cultivate the field just before planting and/or apply herbicides, to destroy volunteer plants.

C. While the seed crop is growing:

1. Carefully rogue the field in all stages when undesirable plants can be recognized, and before they contaminate the seed crop.

2. Clean all machinery before it goes into the field, to prevent introducing undesirable seed or plants.

3. Place a suitable screen across the irrigation canal which brings in water, to prevent washing in seed of undesirable plants.

4. Remove undesirable plants from field edges and the area within the isolation distance, to prevent mechanical or genetic contamination.

5. Insect-pollinated crops must have enough beehives in or beside the field to ensure pollinating the seed crop with its own pollen to set a good yield of seed and minimize undesirable cross-pollination.

6. Regularly inspect the field by the grower or production supervisors, to identify potential contaminants so they can be rogued out before the seed crop is contaminated.

D. At harvest:

1. Before harvest, clean (by plowing or mowing) the field edges, drainage ditches, irrigation banks, open areas, etc., to prevent possible harvest ofundesirable plants and their seed.

2. Clean all machinery and equipment before use, to prevent mechanical admixture of undesirable seed.

3. Identify and label all sacks, bins and equipment, to maintain seed identity and prevent accidental mixing or mislabelling.

E. In conditioning:

1. Clean all machines and facilities before using them, to prevent mechanical mixture.

2. Identify and label all sacks and bins, to maintain seed identity and prevent accidental mixture.

3. Clearly separate and label different seed lots.

F. In storage:

1. Clean all storage buildings and equipment before use, to prevent accidental mixtures.
2. Identify and label all bags and bins, to maintain seed identity and prevent accidental mixtures.
3. Do not stack lots of one crop or variety on top of lots of a different variety or crop.
4. Maintain adequate space and aisles for movement, sampling, and identification of seed lots.
5. Store seed **only** under safe conditions which protect the seed from heat, moisture, chemicals and pests.

WHAT IS "ROGUING"?

"Roguing" is careful and systematic examination of a seed production field to identify undesirable or "rogue" plants, combined with hand removal of all undesirable plants found. A "rogue" is a plant which is offtype, when compared with the standard type of the seed crop/variety; during roguing, other undesirable plants such as weeds and other crops can also be removed. The purpose of rogung is to remove all undesirable plants whose seed cannot be easily and completely removed in conditioning, so seed produced in the field will be of the desired varietal, genetic and physical purity.

Roguing is the most important and effective method of removing contaminants and ensuring seed purity; it prevents physical contamination of seed, and also eliminates contaminants which may cross-pollinate and cause genetic contamination.

Roguing is the main difference between seed production and grain production. For both seed and grain crops, the best possible production inputs and methods are used to ensure maximum yield; in seed production, fields are also rogued to ensure maximum seed quality.

CONTAMINANTS REMOVED BY ROGUING

Two types of contamination may occur in the field:

A. Genetic contamination

Caused by cross-pollination with undesirable plants in the field or within the isolation distance around the field.

B. Mechanical contamination

Caused by admixture of seed during harvest from undesirable plants growing in, or on the edges of, the seed field.

Undesirable plants which cause contamination come from:

A. Previous genetic contamination of the crop which produced the seed used to plant this seed field, so the planting seed is genetically contaminated.

B. Previous mechanical mixture of undesirable seed, either in the field or in the seed used to plant this seed field, so the planting seed is mechanically mixed.

C. Volunteer plants in the seed production field, produced from seed left from a previous crop or carried into the field by water, wind, birds, animals, people, or machines.

Since roguing is visual examination combined with manual removal of identified undesirable plants, it can effectively remove all types of contaminants. Roguing is the only practical, efficient method of:

A. Removing offtype plants and plants of other varieties;

B. Reducing incidence of some diseases transmitted by seed; and

C. Eliminating plants of troublesome weeds and crops which cannot be controlled by cultivation or herbicides, and whose seed are difficult to separate mechanically.

Conditioning can only remove certain undesirable materials; these types of undesirable materials must be removed in the field by roguing, the process of cleaning or conditioning seed fields.

Minimize Roguing by Selecting Clean Seed Fields

Careful selection of the seed production field can prevent problems and minimize roguing work. The field should be selected **before** the planting season, by the following criteria:

A. In the past year, or the time required by Certification Field Standards, no variety or crop that may leave seed or plant parts which can cause volunteeer plants, should have been grown in the field. Verify land requirements when selecting the field.

B. A seed production field should not be located:

1. Below another field which will grow a crop which could contaminate the seed field; or

2. Below a field which grew crops that may contaminate the seed field with undesirable seed brought in by rain or irrigation water.

C. The field should not be crossed by roadways or animal paths; these may contaminate the field with undesirable plants and seed.

D. The field should not be located where it may be contaminated by undesirable seed coming from storages, threshing, farm buildings, etc.

AT PLANTING TIME, PLAN FOR ROGUING

Roguing must cover every area of the field; no area can be skipped, no matter how small. To ensure that all areas are rogued equally, the field must be divided and marked so the roguing crew can thoroughly rogue the field without missing any area, and can go through the field uniformly without distracting their attention from looking for rogues. Planting method can facilitate roguing, by using these practices at planting time:

A. Crops planted in rows: Are easy to rogue; the roguing crew follows the rows.

B. Crops drilled mechanically: Crops drilled mechanically should be planted in the following manner:

1. During planting, the drill should cross the field **only** in parallel trips, to leave straight, easily-followed rows. Do not overplant, drill in circles or other irregular configurations, especially in corners.

2. One planting tube of the drill should be closed, so that it does not plant, but leaves an unplanted strip across the field in each drill width. These unplanted strips or "roguing paths" can be followed by the roguing crew, so they do not drift or wander through the field and miss areas.

C. Crops sown by hand:

Complete, uniform roguing of crops sown by broadcast hand-seeding is difficult; avoid broadcast-planting seed crops. When this planting method must be used, the seed field should be small, square or rectangular in shape, and on level land. Roguing can be facilitated by plowing/cutting parallel "roguing paths" through the field with a single disc or plow.

HOW TO ROGUE

To rogue a seed field, a crew of "roguers"—persons who do the roguing—walks slowly through the field and visually observes the field , systematically and uniformly over all plants, to identify undesirable rogue plants. When an undesirable or **even doubtful** plant is identified, the entire plant—including its roots—is manually pulled up, carried outside the field, and deposited beyond the field borders where it will not be picked up at harvest.

EFFECTIVE ROGUING REQUIRES THE FOLLOWING PRACTICES:

A. The roguing crew should not include more than 5 persons plus the supervisor; larger crews are difficult to control, tend to talk too much or let their attention be distracted from looking at the plants. When a roguer does not give full undivided attention to roguing, he may not see an undesirable plant. If more than 6 persons are required to complete roguing in the available time, divide them into several crews and let them work in different parts of the field. Five roguers and one supervisor is the ideal size for a roguing crew.

B. Each roguer must be a responsible person, well-trained before and during the roguing period on how to identify and remove undesirable plants.

C. The roguing crew should begin in one corner of the field and work systemati-

cally across the field, so they can rogue the entire field without missing any spot. They should walk parallel to the side of the field, and cross the field in the same direction as the rows. In drilled crops there should be roguing paths to follow, so the crew can concentrate on identifying undesirable plants, without wandering or drifting and leaving areas which are not rogued.

D. While the roguing crew is crossing the field, roguers remain more or less side-by-side in a line, with no one much ahead of or behind the crew. The supervisor follows behind them.

E. Each roguer observes (rogues) only a narrow strip. For example, a strip of cereal crop plants 3 - 5 meters wide can be rogued by one person, if the plants are not tall; for tall crops, the strips should be narrower. For crops planted in rows, one person can normally rogue a strip 2 - 8 rows wide, depending on plant height and how easily undesirable plants can be identified.

F. Each roguer should walk on one side of the strip he must rogue. This way, he does not have to turn his head from side to side constantly and risk missing an undesirable plant. Also, the angle at which the sun strikes the plants may help identify undesirable plants; walking on one side of the rogued strip, a roguer can select his position relative to the sun.

G. The roguer does not limit himself to examining and roguing plants in the "arms-length" area he can reach; he also observes the "area of identification", further ahead of him, which he can observe at an angle and from a short distance, and can see undesirable plants better. This distance varies from 3 to 10 meters, depending on individuals.

H. The roguer carefully observes the area from 3 to 10 meters in front, "the area of identification", and also closely studies the area immediately in front of him, thus making a "double roguing".

I. The supervisor follows slightly behind the roguing crew. He walks in a zigzag pattern, moving from side to side over the entire area rogued by all members of the roguing crew working in front of him. He examines the area behind all roguers to see if they are removing all rogue plants. If he finds rogues which were missed, he calls it to the attention of the responsible roguer, and explains the correct way to identify them. Since some persons inherently cannot identify differences between plants, the supervisor must inspect the efficiency of each roguer, and when necessary, replace poor roguers with new personnel.

J. The roguing crew rogues in the pattern shown in Figure 1, staying in a more-or-less even line, with each person in his designated roguing strip, without changing his area or wandering from side to side. The supervisor moves from side to side as he walks, as necessary for the required supervision

K. When an undesirable plant is found, the roguer pulls it out by the roots, so it cannot continue growing (**do not** remove only seed heads; many plants can produce new seed heads before the crop is harvested). The roguer knocks soil off the roots and puts the entire plant in the roguing sack he carries. The plant must not be left in the field; it **must** be carried outside the field far

enough so it cannot be accidentally picked up during harvest. When the roguing crew arrives at the end of the field, they empty rogues from their sacks into a pile **outside** the field. At the end of the day, all piles are picked up and transported completely away from the field; often, they are used for animal fodder.

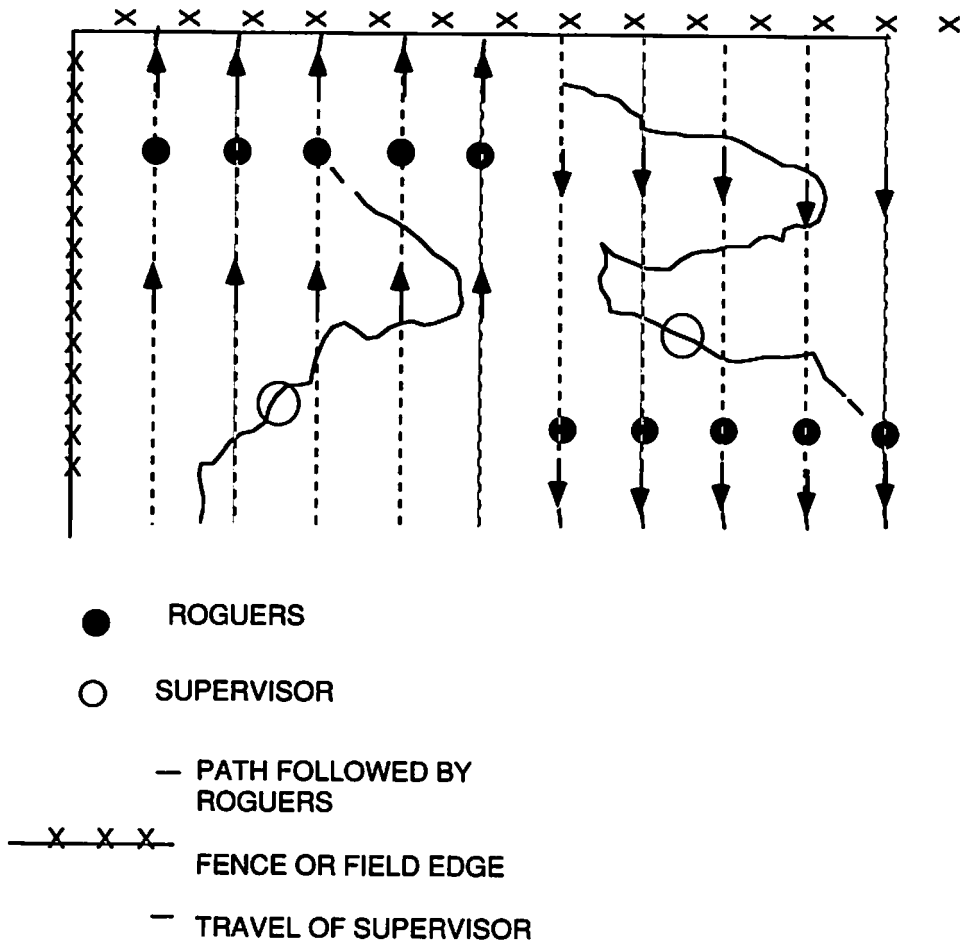

Figure 1. *Diagram of how a 5-member roguing crew follows roguing paths through a seed field, followed by the supervisor. (Adapted from Gregg, et al.)*

L. After several hours of roguing, a person tires from the intense concentration required, and becomes less efficient at identifying rogue plants. It is better to rogue only for a few hours at a time.

M. Some rogue plants are easier to identify when the sun is lower, in the morning and evening (i.e., with the sun's rays striking the plants at a low angle); it is better for roguing crews to work in the early morning and late afternoon. In the time when they are not roguing, roguers can do other work.

N. It is impossible to identify undesirable plants when the wind is blowing, especially in cereal crops. Rogue only when the air is calm; when the wind begins to blow, stop roguing.

O. The roguing crew places a tall stake at each end of the field, to mark the edge of the area already rogued. Move the stakes after each trip across the field, to mark the new edge of the area rogued. This helps the crew rogue the field uniformly, and marks the place to begin roguing the next time.

P. When a spot with many rogues is found, roguers mark their position with stakes and rogue the small spot until it is pure. When this is finished, they return to their original position marked by the stake, and continue the normal roguing. If the small area has a very heavy infestation of troublesome weeds or rogue plants, it may be best to mark them off with stakes, and plow or disk the spot completely out, rather than roguing it.

Q. Many rogues are easier to identify when the sun strikes the plants at an angle to the view of the roguers, as when the sun is to the side of the roguing crew's direction of walking. This is common in roguing cereal grains; for example, an offtype may be easier to see when roguers look toward the sun. In such cases, the crew should work across the field at right angles to the position of the sun; i.e., in the afternoon when the sun is in the west, the roguers work from south-to-north and north-to-south, walking on the east side of their roguing strips, looking toward the west.

WHEN TO ROGUE

Seed fields are rogued before undesirable plants cause either genetic or physical contamination, and in crop stages when the rogues can be identified visually. These growth stages vary with the crop, undesirable species, stage and condition of growth, etc. Seed fields are generally rogued in the following periods:

A. Post-Emergence

Some crops should be rogued soon after emergence, when the crop is still in the seedling or young plant stage; volunteer seedlings from seed left by a preceding crop are easy to identify at this stage by differences in size, growth habit, and their position outside the rows or drills.

B. Vegetative Growth

Roguing is not usually done in the vegetative growth stage, but it is sometimes possible to identify undesirable plants in this stage, so roguing can be done to prevent heavy roguing work later, and distribute the work load better.

C. Flowering

Roguing is usually done during flowering, when it is easier to see important characters—growth cycle, type of inflorescence, color of petals and sepals, etc.—so rogues (offtype plants, other crop plants, weeds, and plants with certain pathogens) can be identified and removed.

D. Post-Flowering

In the post-flowering stage (during development of the seed), many rogues can be identified, so this is a good stage to remove offtype plants which differ in awns, maturity, color, etc., as well as diseased plants, other crop plants, and weeds.

E. Pre-Harvest

Seed crops are rogued just before harvest, when the crop has its mature color and it is easy to identify offtypes which differ in color, awns, maturity, etc. Other crop plants, diseased plants, weeds, etc., also can be identified and rogued out.

Equipment

Roguing depends entirely on a person's ability to see and identify differences in plants, and does not require special equipment.

However, each roguer **must** have a sack to carry rogue plants out of the field. Make a roguing sack by cutting an empty large grain sack (sewn closed at both ends) in half, and sewing a 10-12-cm wide shoulder strap on the open end. For convenience and comfort, and to leave the roguer's hands free for pulling out rogues, the sack is carried on the shoulder by this strap.

Roguing crews should also have a supply of stakes 3 - 3.5 meters long, to mark their position or areas with many rogues.

Selecting and Training Roguers

Effective roguing depends entirely on the ability and constant concentrated attention of the roguers. Inability to distinguish an undesirable plant, talking or distractions which draw attention away from roguing, will cause roguers to miss rogues and may cause the field to be rejected.

Some persons naturally cannot see the small but important plant differences on which identification and roguing is based; others cannot maintain the necessary prolonged attention and concentration. Such persons cannot be used to rogue a seed field. To select a roguing crew, try out several persons and use only the best.

Roguers must be trained, directly in the field, on how to identify and remove undesirable plants, and recognize the characteristics of the seed crop variety.

Preparing the Seed Field for Official Inspection

Before the official inspection—which accepts or rejects the seed field—the grower must study the field standards and regulations, and examine the field to be sure it was properly rogued to remove all undesirable plants and other factors in the standards.

Undesirable and rogue plants must also be removed from the area within the isolation distance; verify that the field is properly isolated on all sides, before the seed crop is contaminated. field edges should be plowed or mowed; drainage areas, empty areas, etc., should be clean.

Efficient roguing is the basic necessity to produce seed of high physical and genetic purity, and to assure that the breeder's improvement reaches farmers with all its improved yield potential. With good roguing of seed fields, farmers will have faith in improved seed as a yield-increasing production input; time and money will be saved in drying and conditioning seed lots; and high-quality crops will be produced.

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