

Let's think about seed quality <Part 3>

Efforts to maintain varieties in the Rice Promotion Project in Uganda

Since rice is a self-pollinated plant, it is relatively easy to maintain genetic purity of seeds, and it is said that there is no problem if seeds are renewed once every three years in ordinary cultivation. Therefore, 1 kg of seeds of the recommended variety are distributed to participant farmers training under the Promotion of Rice Development Project in Uganda, and each farmer obtains the necessary amount of seeds by in-house seed production.

Maintaining genetic purity of the seeds distributed to farmers is an important issue, because it is assumed that farmers will produce and use in-house seeds. The project has been working on improvement of seed production techniques such as breeder's seeds and foundation seeds at the National Crop Resources Research Institute. Particularly, in breeder's seeds cultivation, we keep the purity of the variety not only by removing off-type plants from the field, but also by conducting line cultivation.

In line cultivation, several average plants retaining characters of the variety are selected, and seeds derived from one plant are taken as one line and cultivated in one section. One section has about 100 plants, and 20 to 50 lines (sections) are arranged side by side in the field. If the selected plants are genetically pure as expected, all 100 plants will be exactly the same as the parent plant. But, if some plants become "off-type" showing characters different from the parent plant, it can be judged that the selected parent plant was not genetically pure. In such a case, all 100 plants in the section will be abandoned as well as the off-type plants. Because, if the parent individual is not genetically pure, there may be more mixed plants that are not genetically pure despite showing the same appearance as the original plant type. By managing lines in this way, it is possible to prevent genetic variation from being transmitted to the next generation, which is difficult to judge by appearance alone.

In addition, even if it is uniform within the line of one section, differences may be observed among sections. Even with small differences in plant height which are difficult to distinguish with only one individual plant, it becomes possible to detect the difference clearly by observing individual plants in a group of 100 in one section. When we started the line cultivation in the project, we were able to observe some of these minor differences. For example, while the original plant type shows leaf blades that are angled somewhat inwardly

around the midrib, we found two different lines out of 42 which had leaf blades that were not angled but flat. These small differences we managed to find out only by using the line cultivation system, and it seemed that it was rather easy to be overlooked in removal of off-types by normal seed cultivation.



Procedure of line cultivation -1-
Harvest average individuals from the field planted one by one.



Procedure of line cultivation -2-
Keep the harvested individuals with ears in an envelope one by one.



Procedure of line cultivation -3-
Store seeds from one individual in an envelope written with line ID.



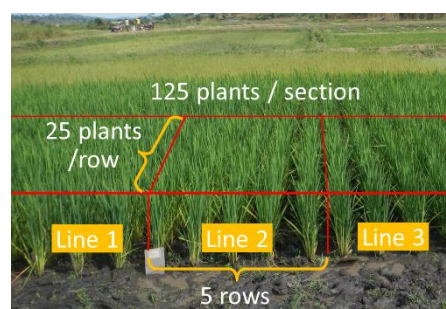
Procedure of line cultivation -4-
Raise seedlings by sowing seeds in a container for each selected line.



Procedure of line cultivation -5-
Transplant seedlings one by one



Procedure of line cultivation -7-
Original NERICA 4 line (left)
Different line with slightly lower plant height (right)



Procedure of line cultivation -6-
Transplant one line one section, in this case, 125 plants (5 rows × 25 plants) are transplanted in one section.

Seed production by line cultivation is an important activity that serves as a foundation of the maintenance of variety and the seed production business as a whole, but for researchers, it tends to be considered as an invisible and even boring activity. However, in Uganda, it is an exciting job full of discovery, which results in the uniform appearance of rice plants.