

Reference 19 Integrated weed management

Summary

Integrated weed management consists of the combination of different control methods, in order to ensure good control of weeds. Combination of methods does not mean that they are simultaneously applied. There are preventive and curative methods, and the combination of different practices will depend on the weed species present, the severity of the problem, and on the crop and plot conditions, but also on the farmers' socio-economic environment and on his technical level of expertise. For technical and economic reasons, integrated management should be used rather than any single method on its own. Several weed management methods are treated in this reference.

Preventive control methods

To prevent weed infestation in rice fields, the following measures can be used:

- Prepare the land well: good land preparation, followed by flooding for at least two weeks kills existing weeds. Good leveling is also important because, if the soil has been well leveled, it will be easier to flood the field to a uniform water depth.
- Clean the irrigation canals and the borders of the field: these areas should be cleaned regularly to avoid weed seeds from entering the rice field with irrigation water.
- Pre-irrigate the field: pre-irrigation induces germination of weeds, most of which can then be destroyed by cultivation.
- Good-quality rice seed is not contaminated with weed seeds and will give good germination rate and good emergence, leading to better and easier control of weeds in the field.
- Varietal choice: a vigorously tillering variety will be competitive with weeds. Some new rice varieties of WARDA, the NERICAs, from a crossbreeding of African rice (*Oryza glaberrima*) and Asian rice (*O. sativa* subsp. *indica*) have good capacities to promote the development of rice production in inland valleys. Some of these varieties have characteristics that challenge weeds (early and vigorous growth, high tillering capacity, appropriate leaf position). The NERICAs are a very flexible technology, especially when introduced to farmers using the PVS (participatory varietal selection) approach (Reference 10).
- Rogue the field: remove rice off-types and weeds that have escaped other measures.

Crop management techniques

The following crop management techniques contribute to weed control in irrigated rice:

- Transplanting rice instead of direct-seeding gives the crop an advantage over weeds, reducing the competitive effect of weeds. Rice can be either transplanted into standing water or the field flooded immediately afterwards to reduce the numbers of germinating weeds.

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- Direct underwater sowing of pre-germinated seeds, while maintaining the water level, reduces weed growth; a high crop density can also make the crop more competitive with weeds.
- In both cases, water management is essential. Good water management in the field helps reduce the weed population, as flooding prevents most weeds from germinating. For instance, it has been proven that *Echinochloa* spp. can be controlled if a water layer of at least 2 cm can be maintained in the field.

Curative control methods

The following weed control strategies are very efficient:

- Hand-weeding (including roguing).
- Mechanical control.
- Chemical control (Reference 20).

Hand-weeding and mechanical control are easier to implement if rice has been transplanted or sown in rows, as the rotary hoe, the *daba*, and other traditional instruments can be used. Although hand-weeding requires a lot of labor, it is often effective. Hand-weeding after direct broadcast sowing is difficult and not very efficient, as it takes time and may damage the crop.

Cleaning up the field

The field may have to be cleaned (rogued) if weeds have escaped earlier control. Grasses are not easy to identify before flowering and should be removed by hand before they are able to produce seed. Roguing is the removal of any plant—including weeds, rice off-types and wild rice—other than the rice cultivated. A mixture of varieties decreases the quality of the paddy, as it not only affects the quality of white rice after processing (heterogeneous product), but also affects the cooking quality (heterogeneous cooking, changed taste); thus, possibly resulting in a depreciation of the production value. From flowering onward, it is important to start cleaning up the field. However, because flowering is a very critical stage (Reference 8), entering the field can cause damage to the crop. For this reason, when cleaning up, keep to the following instructions:

- Locate the rice off-types and enter the field slowly from the closest edge, using your arms to clear the way (avoid wearing wide clothes).
- If weeds flower earlier than the cultivated rice, start removing them before rice is flowering; if the cultivated rice is earlier, wait for the rice off-types to flower and enter the field only in the evening (after 16:00) or very early in the morning (before 09:00) to clean up.

Bibliography

Johnson, D.E., 1997. *Weeds of Rice in West Africa / Les adventices en riziculture en Afrique de l'Ouest*. WARDA/ADRAO, Bouaké, Côte d'Ivoire, 312 pp.