
Increasing flexibility in crop production through DAPOG nursery to reduce the impact of droughts and floods in Cambodia

SUMMARY:

Cambodia is highly vulnerable to natural hazards such as droughts and floods, which annually occur and often significantly affect the agricultural sector as crops are damaged or destroyed. To reduce these adverse impacts flexibility in crop production is essential. Adopting the practice of Dapog nursery has helped to increase farmers' flexibility in crop production and has reduced losses in both wet and dry conditions. The Dapog nursery can be constructed on various surfaces, such as in the fields, on small portions of land, or even on concrete floors as long as there is a reliable water source nearby. It allows seedlings to grow quickly in a relatively small space. Furthermore, the strength of young seedlings (10 to 14 days old) is improved. Consequently, they suffer less from the transplanting shock and are more resistant to biotic and abiotic stresses like pests, floods, droughts and storms. This method takes less time to construct than conventional seedbeds and reduces the amount of labor needed as the pulling of seedlings is eliminated. As a result and due to the flexibility of this method, the Dapog nursery proves to be a good practice to potentially increase yield and additional income as well as to contribute to people's food and nutrition security.

KEYWORDS:

[Seedbed preparation](#) [1]

[Drought resistance](#) [2]

[Rice](#) [3]

[Flooding](#) [4]

[risk management](#) [5]

CATEGORY:

[Climate change and disaster risk reduction](#) [6]

[Crop production](#) [7]

COUNTRIES:

Cambodia

DESCRIPTION:

Introduction

Originated in the Philippines (IRRI, 1972), Dapog nursery of raising seedlings was adopted in Cambodia in the 1990s. Through this method, the seedlings can be quickly raised without any soil. This allows some flexibility in where seedlings can be raised. For instance, Dapog nursery can be constructed in the fields, on small portions of land, or even on concrete floors as long as there is a reliable water source nearby (Peace Corps Information Collection & Exchange, 1980). Furthermore, the method reduces labor, because seedlings do not need to be pulled and planted. In Cambodia, the use of the Dapog nursery method has become more popular, due to this flexibility.

This good practice option (GPO) is part of the document 'Good practice options for disaster risk reduction in agriculture in Cambodia', which consolidates 10 GPOs that were endorsed by the General Directorate of Agriculture (GDA), Cambodia, under the joint GDA FAO DIPECHO project 'Enhancing capacities for disaster risk reduction in agriculture in Cambodia and the Philippines'.

Objective

The objective of the Dapog nursery method is to help reducing risk in the face of droughts and floods in Cambodia due to its flexibility and its production of healthy and resilient seedlings.

Implementation

The Dapog nursery method is suitable for small and medium scale production. For large scale production it is possible to modify the method with the use of machines, but this has not yet been implemented in Cambodia. The method is also suitable for production in areas that experience droughts and floods.

The implementation steps below follow the recommendations from IRRI (1972), a local NGO in Cambodia (RCEDO, 2013), the SRI Technical Guidebook 2013 by the General Directorate of Agriculture, and other studies in Cambodia.

Step 1: Selection of rice variety

First, farmers must identify the rice variety that they want to transplant. Second, it is important to select a suitable seed variety that is resistant or tolerant to droughts, floods, salinity, and pest infestations. The rice seed should be pure and uniform in size and color.

Step 2: Testing of viability of seed

It is important to test the viability of seed before planting. This can be determined through a germination test, which can be undertaken through three methods, namely the Ragdoll method, the Petri dish method and the seedbox method. These methods are quite similar except for the containers used to test the viability of seed. The Ragdoll method is most frequently used in Cambodia and described in the box below.

The Ragdoll Method

Choose 4 groups of 100 seeds to be tested. You will also need 4 pieces of cloth of 15 X 20 cm. Soak the cloth in water and then squeeze the excess water out. The moist cloth will allow the seeds to stick. Then, lay the cloth out on a flat surface and place 100 seeds on each cloth in rows of 10, leaving a 2cm border around the edges of the cloth. Next, place a bamboo stick along the long end of the cloth and roll each cloth around the bamboo stick. Be careful not to displace the seeds when rolling the cloth. After that, secure each cloth with rubber bands or strings to keep it rolled around its bamboo stick. The seeds will start to germinate. It is important to continuously moisten the cloth during the process by dipping it in water. It is generally necessary to dip the roll 3 times each day. The rag should be labeled and stored in a shaded place. Germination will take about 4-5 days. After germination, count the total number of seeds that have a shoot longer than 1cm. The ones that have shoots shorter than 1 cm are considered not viable and these seeds may have been damaged. Then, divide this total number of the four rag dolls by 4. This will provide the total germination percentage. If the percentage is higher than 80%, then the seed can be planted. If the percentage is between 60-80%, more seeds may need to be planted to make up for the low viability. If the percentage of germinated seeds is below 60%, then the seed should not be used unless there is no other seed available (IRRI, 1972).

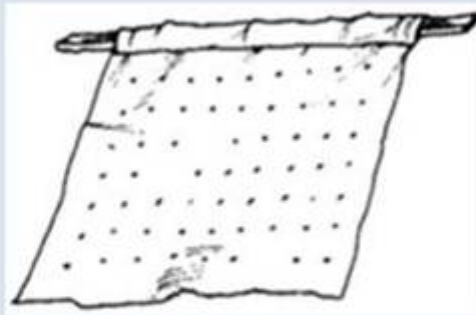


Figure 1: The Ragdoll Method

Source: The International Rice Research Institution (IRRI). Tropical rice grower's handbook: *Production of seedling*. Manila, Philippines

[8]

Step 3: Selection of the seedbed

The Dapog nursery should be located in a sunny location, but near a water supply, as it will need to be frequently watered. In Cambodia, experience has shown that it is also preferable to locate it near the house where it can be monitored to protect the seedlings from birds and chickens.

Step 4: Preparation of the seedbed

The size of the seedbed should be as follows: width: 1 to 1.5 meters and length: 10 to 20 meters; plots wider than 1.5 meters are more difficult to transplant- To make the seedbed place a plastic sheet or banana leaves as the base of the seedbed, in a field or on a cement floor. Slightly raise muddy surface or dry mix soil (about 4 to 5 cm). Mix the soil well, and surface it evenly.

Step 5: Seed distribution

Seeds should be germinated after 36 to 48 hours. Then sow the seeds by scattering them over the prepared plots. Use 1 kg of seeds per m². Use a wooden board to press the seeds into a layer of a three-seed thickness. Be careful not to press too hard, because it will cause the mud to squeeze out of the seedbed. Immediately after sowing the seeds, sprinkle a bit of water. Do not pour too much water, because it might re-locate the seeds.

Step 6: Seedbed management

Water the seedbed three or four times each day. Never let the seedbed become dry. Make sure the germination occurs evenly. Every day, gently press the seeds so that they touch the banana leaves or plastic sheet. This should be done until the fourth day. After 4 days, water the seedbed continuously so that it is covered with 1 to 2 cm of water.

Step 7: Preparation of seedlings for transplanting

The seedlings will be ready to be transplanted in 10 to 14 days. To prepare the seedlings for transplanting, loosen the seedbed. Then roll the bed with the banana leaves/plastic sheet inward and the roots facing outward. The roll is then ready to be carried to the field for planting.

Benefits

There are several benefits of applying the Dapog method within the context of disaster risk reduction:

- The use of Dapog nursery provides more flexibility than the use of the wet/dry-bed nurseries, as they can be located anywhere if there is a reliable water source nearby and applied in both wet and dry conditions;
- The seedbed can be made on various surfaces, including concrete floors, a raft made of banana stalks or an elevated platform (IRRI, 1972);
- It does not require a large seedbed and the nursery takes less time to construct than conventional seedbeds;
- Seedlings grow faster in a small space and are ready for transplanting within 10 to 14 days of sowing;
- The strength of the young seedlings (10 to 14 days old) is improved. Therefore they suffer less from the transplanting shock and are thus more resistant to abiotic and biotic stresses;
- The method reduces labor requirements as the pulling of seedlings is eliminated.

Previously, it was difficult to produce rice seedlings due to floods and droughts. I learnt about the Dapog nursery method, an easy technique to produce seedlings. Even if there are floods or agricultural droughts, I still have seedlings for transplanting. This technique consumes less time, saves labor, uses less seed, and produces healthy rice seedlings. It is a cost effective technique and I can save some money from applying this technique. I would like to thank the RCEDO organization that introduced this technique in our community and provided technical advice.

Sun Sokhom, 45 years old, Ampil village, Pongro commune, Chongkal district, Otdar Meanchey.

[9]

FURTHER READING:

Cambodia-IRRI Rice Project. 1993. The Khmer edition of 'Raising seedling by the Dapog method'. Phnom Penh, Cambodia.

General Directorate for Agriculture/Ministry of Agriculture Forestry and Fisheries Cambodia, Srer Khmer and Food and Agriculture Organization of the United Nations, 2014. Good practice options for disaster risk reduction in agriculture in Cambodia. Phno

General Directorate of Agriculture. 2013. The System of Rice Intensification Technique. GDA-MAFF. Phnom Penh, Cambodia.

International Rice Research Institute. 1972. Tropical rice grower's handbook: Production of seedling. Manila, Philippines.

Peace Corps Information Collection & Exchange. 1980. Rice production. A Training Manual and Field Guide to Small-Farm Irrigated Rice Production. USA.

Rural Community and Environment Development Organization RCEDO. 2013. Case study. Ampil village, Pongro commune, Chongkal district, Otdar Meanchey.

SOURCE:

[Natural Resources Management and Environment Department, FAO](#) [10]

Contact person:

Stephan Baas / Selvaraju Ramasamy

Contact email:

climate-change@fao.org

Country:

Italy

Source URL: <http://teca.fao.org/technology/increasing-flexibility-crop-production-through-dapog-nursery-reduce-impact-droughts-and>

Links:

- [1] <http://teca.fao.org/keywords/seedbed-preparation>
- [2] <http://teca.fao.org/keywords/drought-resistance>
- [3] <http://teca.fao.org/keywords/rice>
- [4] <http://teca.fao.org/keywords/flooding>
- [5] <http://teca.fao.org/keywords/risk-management>
- [6] <http://teca.fao.org/technology-categories/climate-change-and-disaster-risk-reduction>
- [7] <http://teca.fao.org/technology-categories/crop-production>
- [8] <http://teca.fao.org/sites/default/files/Cam8.jpg>
- [9] <http://teca.fao.org/sites/default/files/Cam9.jpg>
- [10] <http://teca.fao.org/partner/natural-resources-management-and-environment-department-fao>