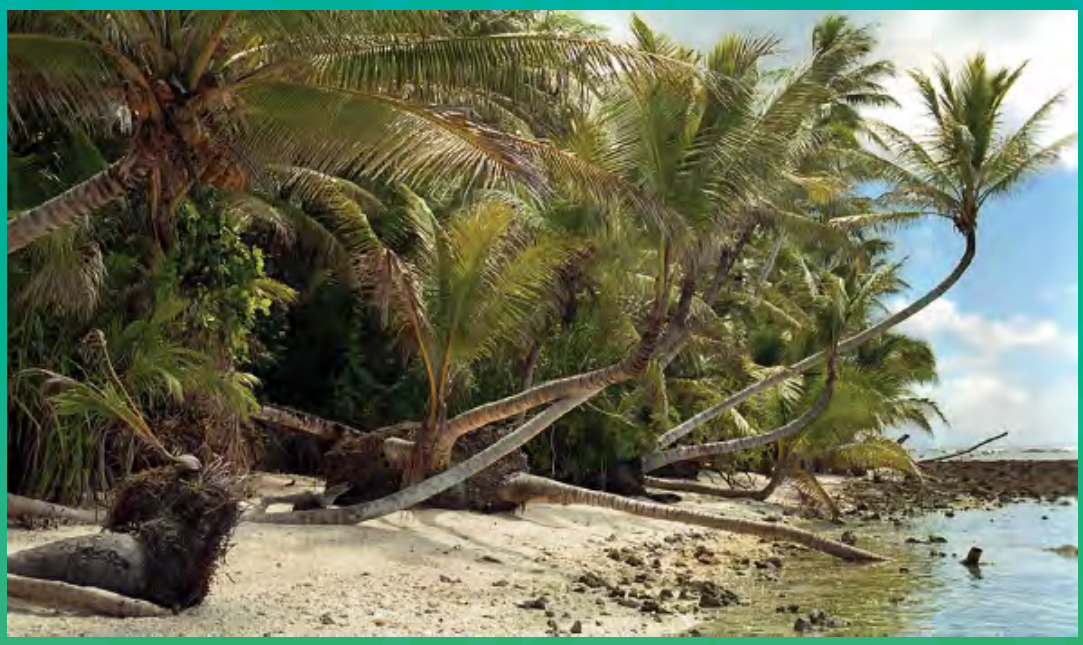
Pacific Community
Communauté du Pacifique

Coconut Risk Management and Mitigation Manual for the Pacific Region



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Suva, December, 2021

LRD
Land Resources Division

Original text: English

Pacific Community Cataloguing-in-publication data
Bourdeix, R. (Roland)
Coconut risk management and mitigation manual for the Pacific region / compiled by R. Bourdeix, J. M. Sourisseau and J. Lin

1. Coconut – Oceania.
2. Coconut – Oceania – Handbooks, manuals, etc.
3. Coconut – Management – Oceania.
4. Coconut industry – Oceania.
5. Coconut products – Oceania.

I. Bourdeix, R. (Roland) II. Sourisseau, J. M. III. Lin, J. IV. Title V. Pacific Community

634.6170995 AACR2

ISBN: 978-982-00-1429-9

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To cite this manual:

Bourdeix, R., Sourisseau, J. M., & Lin, J. (Eds.). (2021). Coconut Risk Management and Mitigation Manual for the Pacific Region. Land Resources Division, SPC.

To cite a chapter of this manual:

Lin, J., Alasia, J. P., & Helsen, J. (2021). Risks linked to organizational and policy issues. In R. Bourdeix, J. M. Sourisseau & J. Lin, J. (Eds.). *Coconut Risk Management and Mitigation Manual for the Pacific Region* (pp 99-100). Land Resources Division, SPC.

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13. METHODS FOR SELECTING PARENT PALMS

By R. Bourdeix, V. Kumar, V. Mataora, U. Remudu and J. L. Konan Konan

Description

The method consisting of simply harvesting seednuts on 'best' palms is what scientists are calling '*mass selection using open pollination*'. Although this method has been practiced by thousands of farmers for millennia, its efficiency over the short term remains very limited. Coconut is a perennial crop and yields of individual palms fluctuate unpredictably within the year and between years. It can be improved slightly by using best selection criteria but, even in this case, for each generation of palms in farmer's fields, the yields' improvement will be very limited, probably no more than 5 to 10%.

So, there is a risk that the planting material used by farmers will remain the same, with limited genetic improvement, only shaped by the forces of nature, from generation to generation. Such low yields may lead to poverty, economic vulnerability and the difficulty of responding to shocks. Even if some Pacific farmers have developed better techniques, as illustrated by our movie from the Cook Islands, their knowledge may not be transmitted and disappears because of globalization.

Occurrence and severity

In the expert's opinion, up until 2018, the processes of parent palm selection conducted by agricultural officers in farmer's fields in most Pacific countries has not provided significant improvement of the existing varieties. In many cases, selection is only visual: within a plantation, 50 to 80% of the existing palms are often selected as parent palms for seednuts production.

In some cases – selecting only the largest fruits without taking account their composition, using the small germinated seednuts forgotten in the farms - these practices may even reduce the yields. The intensity of selection (selection pressure) is low so that this risk remains limited.

Thus, in the expert's opinions, most of the selection processes used so far in the Pacific region are only conservative, meaning that the progeny of the parent palms generally has the same genetic value as the population from which they are selected.

Mitigation and adaptation

An alternative method conceived by R. Bourdeix and V. Kumar was proposed in the CIDP website and used to design proposals for implementation of better seed production systems. This method is based on: 1) a higher selection rate, only 10% of the existing palms; 2) not only on visual appraisal but also on fruit analysis conducted directly in farmer's fields; and 3) on securing all the data in a comprehensive geo-referenced database.

We created seven data sheets or forms for recording all the requested information: first about farmers and farms; 2) palm localization; 3) Palm characterization; 4) and 5) two methods for mature fruit analysis; 6) tendernut analysis; and 7) Nursery test for discarding hybrids.

Implementing such a process needs preferably a team of two or three workers, of which one is an agricultural officer and a coconut climber/harvester. The total working time is probably

between one and two hours per selected palms, including the nursery test. Agricultural officers should ask for temporary recruitments of workers when needed.

The numbering of the palms is crucial. The experts strongly recommend buying sets of already numbered aluminium tags (from 1 to 1000) that will be placed with nail on the east side of the palm at about 1.80 meter above the soil, in addition to band painting. By using these tags, if another agricultural officer comes back 15 years later, he/she be able to find the palm again.

When collecting seednuts on farms, there is a way for farmers to avoid selfing (self pollination) of palms and inbreeding depression: select green palms for harvesting seednuts; germinate the seednuts and look at the colour of the sprout; keep only the brown sprouts for planting (this means green father, brown mother, so sure that the mother is not also the father). Such a method could increase the yield of 5 to 10%.

Selection of seedlings in the nursery, based on germination speed and the vigour of seedlings have proven to increase yield of a coconut population by 10- 12%. Thus, after nursery laying, selection on non-germinators in the nursery after 80% germination should be culled. Then after 7 months, seedlings should be selected based on vigour and that selection step culls another about 10% seedlings leaving only 70% seedlings for releasing to farmers from a well managed nursery. Currently in the Pacific region, this is not practiced. This concept should be introduced to all nurseries and also to farmers who are raising their own seedlings.

Actions to undertake

- Recover the maximum information about coconut breeding and research programs conducted in the past. This is particularly preoccupying in Tonga, the Solomon and French Polynesia. Management of information systems should be improved in ministries and research centre, and technical information effectively archived in the long run.
- Revive coconut breeding programs in the Pacific region. The examples of Côte d'Ivoire and Vanuatu show that a yield increase of 10- 20% - up to best existing hybrids – can be obtained in one generation by testing combining ability of individual male parents.
- Conduct more studies about removing the worst palms in a plantation, and planting with palms grouping, as explained in the CIDP website. Selection criteria for removing the less productive palms are to be improved: see for instance the video describing the traditional technique applied by an old farmer from Atiu, Cook Islands.

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