

Date palm pollination: techniques adapted to agroecology

Agroecological zones

Oases

Introduction

The pollination of date palms is necessary for the production of ripe dates of good quality. But male date palm producing pollen and natural pollinators are often insufficiently present to ensure good natural pollination. In the context of climate change, research found that date tree pollination difficulties are increasing due to poorly synchronized flowering between male and female date palms. Finally, it is difficult to find qualified workers to carry out manual pollination and to ensure their safety.

Certain agroecological practices can improve pollination efficiency and strengthen the resilience of palm plantations in the face of climate change and anthropogenic pressures.



Source: INAT, Tunisia



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Importance of pollination for date production

Date palm is a dioecious species, with separate male and female stems. Pollination of the female flowers by pollen from the male flowers is essential for fruiting. Dates developed by parthenocarpy (from unpollinated flowers), known as "sich", do not ripen and are of poor quality.

Efficient pollination leads to: **optimum production**: higher fruit set rates and greater quantities of fruit produced; **improved date quality**: more uniform fruit size, better distribution of sugars and nutrients; and **reduced diseases**: efficient pollination promotes healthy fruit growth, thereby limiting certain infections.

Pollination techniques

For date palms, **natural pollination** by wind, bees and other insects does not guarantee satisfactory fruiting. In fact, if only natural pollination is used, yields are reduced by up to 50%, due to obstacles linked to the length of time the stigmas are receptive and the quantity of pollen available. As a result, artificial pollination is widely used.

Artificial pollination is widespread, especially for commercially prized varieties such as Deglet Nour, which is widely grown in Tunisia and Algeria.

- **Manual pollination**: Traditionally carried out by farmers or specialized workers, this method involves climbing up the trunk to the female inflorescences, to apply pollen directly to the flowers, or inserting one to four male spikelets in the centre of the female inflorescence and attaching them to the distal end of the spadix, followed by a ligature at the level of the regime rachis on the palm rachis. This technique requires skilled labour, but allows optimum control of the process. Depending on the year, three to six passes are required per Deglet Nour female plant, given the staggered bursting of the spathes.



Source: INAT, Tunisia

- **Pollen storage and preservation**: Pollen can be collected and stored in a cool, dry place in the shade. It can also be stored in the fridge or frozen for later use.
- **Mixing pollen from different origins**: The ancestral technique of mixing pollen from different male pollinators has proved its effectiveness. It ensures a good pollination rate and increases fruit set.
- **Mechanized and semi-mechanized pollination**: Pollination can be carried out without climbing onto the female plant, by spraying pollen powder mixed with talcum powder (20% pollen, 80% talcum powder) to distribute the pollen evenly.
 - **Semi-mechanized pollination with manual sprayers**: The use of manual sprayers (blowers) fitted with a piston pump. The pollen is released under the effect of the air pressure exerted inside the pump. Research shows the effectiveness of this type of equipment, which is inexpensive to purchase.
 - **Mechanized pollination with motorized dusters** fitted with pumps or pesticide dispersal equipment fitted with simple mechanical devices, towed or pulled by a motor.



Source: Ahmed Nourani, in Nourani et al. 2017

Photo: Example of a semi-mechanical pollinator tested in Algeria

a) Powder arm; b) Recoil rods; c) Pull wire; d) Powder gun; e) Telescopic pole; f) Powder thrower

Source: Ahmed Nourani, in Nourani et al. 2017

Integration of agroecological practices

a. Agroforestry systems and crop associations

Combining date palms with leguminous or fruit crops promotes biodiversity and creates a microclimate conducive to successful pollination (reduced wind gusts, lower temperatures, preservation of humidity), which increases the viability of female flowers and prevents premature drying.

a. Biodiversity

- **Planting male pollinators:** Planting male plants in each plot is necessary to avoid having to "import" pollen from other production regions, which increases phytosanitary risks and reduces pollen viability.
- **Planting varieties other than Deglet Nour:** Plots with a varietal mix of varieties other than Deglet Nour are more tolerant to phytosanitary problems. The presence of varieties that require less pollination than Deglet Nour also provides the farmer with a guaranteed income.

Examples of initiatives in the Mediterranean to use local seeds

- **Pollen availability:** The number of male plants is often insufficient, especially in new oases. The flowering of male and female plants may not be synchronized. Farmers therefore use pollen from other areas. This type of pollen comes from male inflorescences collected at random in other regions and sold on local markets. The quality and viability of this pollen are not controlled, and a phytosanitary risk exists through this exchange of plant material from different growing zones.
- **Mixing wheat flour or cornflour:** with pollen instead of talc this practice is adopted by growers for its lower cost. But wheat or corn flour absorbs moisture, becoming sticky or forming lumps. In hot, humid conditions, this favours the proliferation of mould or rot, which can reduce the chances of pollination and cause phytosanitary problems.



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