

Optimising pollination in date palm: work proposal

Introduction:

The date palm (*Phoenix dactylifera* L.) is a monocotyledonous and dioecious perennial species, which belongs to the family Arecaceae. Male and female flowers are arranged in strands that attach to a rachis forming an inflorescence called spadix. A bract, called spathe, enclosing the immature inflorescence, splits longitudinally at anthesis, which allows for the pollination of mature male and female flowers which are borne on separate individual palms.

During pollination period, availability of date pollens in sufficient quantity is a serious concern for date growers. Furthermore, pollination may have to be repeated once or twice after rains during pollination season. This situation necessitates a large quantity of pollens which may not be readily available at that time. Moreover, the effects of pollen on date quality through metaxenia are well documented, and male genotypes with desirable qualities are maintained in the plantations and commonly used to hand pollinate female trees. Therefore, optimising the pollination process is very important to maximize fruit setting and produce high quality fruits.

Work outline:

1. Determine signs of stigma receptivity when the female spathes start splitting. This can be achieved chemically by using stigma receptivity tests and experimentally by controlled pollination.
2. Optimising *in vitro* germination and pollen viability tests for the dominant male cultivars.
3. Determining the best hours during the day for efficient pollination.
4. Examining the effect of repeated pollination to maximise fruit setting.
5. Optimising pollen application methods where pollens can be economised by mixing the pollens with an appropriate carrier in a proper effective ratio. Hence, other application methods such as liquid pollination will be used and its effect on fruit setting and all fruit quality measures will be determined.
6. Develop best fruit thinning procedure regarding time and severity of thinning.
7. Studying the compatibility between male and female cultivars by crossing these cultivars in all possible combinations. The effect on fruit production and quality (metaxenia effect) will be analysed to determine the best cross combinations. This will help in planning for removal of less efficient male trees and future expansion by planting more compatible pollen-source trees.
8. Work to be carried out at the Riverland date Garden 376 Gurra Road, Gurra Gurra SA 5343

Methods:

Pollen application:

The old pollination technique is to place an entire male spathe in the crown of the female palm leaving the rest to be wind pollinated. It has been abandoned because of non-availability of large number of male spathes. Alternatively, pollination can be done either by placing spikelets of male flowers in the freshly opened female spathe or with hand pollination. In our trials, we will use the placement method where male strands can be placed inverted among the female strands or by using a puffer or mechanical devices. However, a proposal to automate this mechanical pollination is under study at this stage.

Fruit setting and production analysis:

The data will be recorded on fruit set percentage after two months of controlled pollination. Number of fruit/spathe and the total yield of fruits at the harvesting stage will be recorded.

Fruit quality analysis:

1. Fruit size (length and diameter), single fruit weight, stone weight, total soluble solids and yield/plant will be recorded at fruit maturity.
2. Fruits resulted from all different crosses of male and female cultivars will be analysed for their nutritive value. Energy, carbohydrates, protein, fat, cholesterol, dietary fiber, vitamins (folates, niacin, pantothenic acid, pyridoxine, riboflavin, thiamine, vitamin A, vitamin C, vitamin K), Electrolytes, Minerals and phyto-nutrients (Carotene- β , Crypto-xanthin- β , Lutein-zeaxanthin).

Kind regards,
Nabil

Dr Nabil Ahmad | Research Fellow – Horticulture
Plant Breeding Institute | Faculty of Agriculture and Environment

THE UNIVERSITY OF SYDNEY

107 Cobbitty Rd | Cobbitty | NSW | 2570

T +61 2 9351 8829 | F +61 2 9351 8875 | M +61 448006422 (Mobile, Whatsapp, Viber) | Skype: dr.nabil.ahmad

E nabil.ahmad@sydney.edu.au | W http://sydney.edu.au/agriculture/academic_staff/nabil.ahmad.ph