United Arab Emirates University
Date Palm Development Research Unit Dept.
Date Palm Tissue Culture Laboratory (DPTCL)

Guidelines and Tips for the Cultivation of Tissue Culture-Derived Date Palm Trees

Introduction

One of the major objectives of the UAE University's Date Palm Development Research Unit is to promote the distribution of scientific literature and technical information regarding modern techniques used to propagate date palms, by issuing technical newsletters and brochures.

With this objective in mind, the unit launched a programme to ensure the proper establishment of distributed offshoots which provides growers with precise technical protocols and itineraries, detailing all the required procedures starting from palm delivery up to field planting and the first fruit production.

Advantages of Tissue Culture-Derived Date Palms

Tissue culture-derived date palm cultivars have many advantages when compared to the two main traditional propagation techniques (seeds and offshoots), as listed below. The date palm cultivars produced by the UAE University's Date Palm Development Research Unit consequently have the following advantages:

- 100% Genotypic and phenotypic identity in terms of the distinguishing characteristics of the parent date palm cultivar.
- Rapid growth when compared to ordinary offshoots and early production, since cultivars can fruit at the start of the third or fourth year after planting, depending on the quality of care provided by growers.
- High quality date palm varieties that are disease and pest-free.
- Palms are easier to handle and transport between locations (locally and internationally) because of the small plant-size and its low weight, leading to lower transportation costs and preventing exposure of the plants to pathogens.
- Synchronized growth of the cultivars with uniform characteristics (age, height, flowering time, production type) which facilitates the use of modern machinery for pollination and harvesting and simplifies management of the date palms.
- Very high survival percentage of the date palms due to healthy, strong and well-established root-systems. Provided correct care

is given during growth, the survival rate of the tissue culture-derived plants reaches 100%, with the plants showing consistent growth and production patterns.
- Delivers higher-yielding date palms when compared to trees derived from traditional offshoots.
- Prices of tissue culture-derived date palms are favourable when compared to ordinary offshoots, which are usually high in price, taking into consideration the quality and rarity of certain varieties.

Preparations Prior to Planting Tissue Culture-Derived Date Palm Trees

- Examine the soil to ensure there is no hard rocky layer or large boulders directly beneath the planting surface. If such is the case, all sub-soil boulders and rocks should be removed from the planting area.
- Ensure the water supply is of good quality and not salty, as it will negatively affect the growth and development the date palms.
- Prepare the irrigation network according to the allocated planting spaces.
- Stake out the planting field using lines and mark the individual planting spaces as needed. It is recommended that growers use a square planting system (7×7), (8×8) or (7×8) taking into consideration the variety, type of soil and the climate (specifically the humidity). There are many factors that should determine the spacing amongst planted trees such as:
    1) Allowing sufficient space between the date palm trees so that they receive sufficient sunlight once they mature.
    2) Allowing enough space between individual trees to allow maintenance to be performed by workers.
    3) Provide enough space in the soil to allow proper root growth.
- Prepare the necessary planting holes for the palm trees with dimensions no smaller than 75×75×75 cm. It is suggested that the hole is left exposed to the sun and air for a few days to eliminate possible harmful microorganisms.

- Mix soil with a chosen manure (it is recommended to use thermally treated organic manure that shows good solubility). The topsoil should be collected, put aside and used in the preparation of the planting mixture which will be placed at the bottom of the planting hole. The planting mixture is prepared by mixing the topsoil with peat moss and alluvium in a 1:1:1 ratio. If no peat moss is available, it is suggested that a mixture of 1 part sand and 1 part alluvium is used.
- The planting hole should be filled with the prepared planting mixture approximately half-way or two-thirds and irrigated two or three times before planting the date palm, to ensure that the planting mixture acquires a consistent texture and settles at the bottom. The irrigation water will also help to drain any extra salts and promotes composting of the organic material.

Process of Planting of Date Palm Trees

The planting process is the most important and critical stage in establishing a new date palm field or farm. Any errors made during the planting process may lead to a low survival rate, poor establishment and/or poor agronomic performance of the date palms, regardless of the efforts put in during the earlier preparation stages.

- Date palm trees can be cultivated at any time of the year if given special care and good planning, especially during cold winters and very hot summer seasons. Cultivation during spring and autumn seasons is preferred because they provide mild conditions and good seasonal timing for growth. Planting during spring avoids damaging cold and makes use of the warm weather, helping to speed up growth. Whereas planting during autumn provides the date palms with more time to stabilize and establish in the field before the extremely high temperatures of the summer season.
- The planting process should be started during the early morning to reduce the strain placed upon the trees and also to give them sufficient time to adapt to conditions in the soil.

- The height of the date palms, which the growers receive from the laboratory, should range from 35 to 40 cm. Each tree should have about 4 to 5 branches including the three leaves, known as the original leaves. The trees' base should have an onion-like (or fig-like) shape, and should have a strong root system which is suitable for growth.
- The transport of date palms must be done in a careful and appropriate manner, and they should not be put on top of each other to avoid breaking the stem or causing damage to the branches.

- The steps listed below should be followed when performing the planting process:
    1) The plastic bag should be cut open from the base first, to ensure the safety and integrity of the root system.

    2) The date palm should be placed in the planting hole with extra care, ensuring that the core of the tree (the grown top) is slightly below the soil surface (approximately 25 to 30 cm), and should be positioned vertically but slightly tilted towards the opposite direction of the wind.

3) Soil should be placed around the tree and then the plastic bag is pulled out and upward.



4) The soil should then be pressed tightly around the tree to eliminate any air pockets around the root system, which might lead to its decay. The golden rule to planting a date palm is to ensure that the wide diameter of the trees' base (onion- or fig-shape) is placed at the soil level and that the irrigation water does not come into contact with the central heart of the tree.

5) Directly after planting each date palm, two soil beds should be prepared: the first bed should be next to the heart of the tree to prevent irrigation water from reaching it; and the second bed on the outside with a 1 m diameter to receive irrigation water, keep it from being wasted and to ensure the direction of sufficient water to the trees' root system. The depth of the hole is recommended to be around 20 to 30 cm.

6) The date palm trees should be surrounded with a fence and covered with plastic or bale nets to protect it from harsh climate factors (sun and wind during its first summer and through the cold of the first winter) and foraging animals such as rabbits and other rodents.

Date Palm Tree Protection and Post-Planting Care

- The date palm trees must be irrigated daily in a consistent manner for an initial period of 40 days, taking into account the type of soil and avoiding flooding of the heart of the tree. Care must be taken to wet the soil around the tree to the same consistency each time and not leave it too wet or dry.
- After the first initial period of 40 days (after the date of planting), irrigation of the tree may be reduced to two or three times a week for the next two months (if the type of land and the climate of the area allows it).
- After the third year since planting the trees, each date palm irrigation bed should be widened to have a diameter similar to the diameter of the extent of the branches.
- It is recommended to leave only 3 to 4 offshoots (equally spaced) attached to the tree and to remove extra offshoots in order to give the date palm enough space for good growth and expansion. Soil must be covered well with dust at the site of offshoot cutting and a good pesticide should be used to protect the date palm from infection with *Rhynchophorus ferrugineus* (Red Palm Weevil) or any other harmful pests.
- It is recommended to remove the spadix (spike) during the first and second year after planting, in order to allow the tree to grow naturally and develop a strong and dense trunk.
- It is recommended that thermally treated organic manure is applied one year after planting the trees (i.e. at the start of the second year), applying it as follow:
  5 kg / tree: 2nd year
  10 kg / tree: 3rd year
  15 kg / tree: 4th year
  20 kg / tree: 5th year
  25 kg / tree: 6th year
  This treatment programme is to be fixed until the tenth year, in addition to applying an annual compound chemical fertilizer, containing 100 g Nitrogen, 75 g Phosphorous and 100 g Potassium per date palm.

- Starting from the fourth year from planting, the inflorescence cluster per spadix (pollination site) should be left on the tree at a ratio of 2-3.

- It is recommended that a suitable date palm cultivar with ‘Bayoud’ resistance is used, and to use male cultivars that have superior pollen, favourable metaxenia characteristics and enough pollen or inflorescence clusters to pollinate the female spikes (spadix).
- The pollinated spadix (spike) should be covered with paper bags for about one or two weeks, to prevent foreign external pollination.
- Instructions and guidelines provided should be followed carefully and good care must be taken of the date palm trees, if a grower is aiming on obtaining good growth and high yields.
- The careful following of these instructions and guidelines should ensure a success rate of 95-100% in establishing a functional date palm field. Along with the supplied irrigation plan, annual fertilizing programme and the regular removal of weeds and grasses, the grower should also carefully monitor the date palm field during the first 10 to 12 months after planting in order to identify potential problems early-on and to take effective preventative measures.

Date Palm Development Research Unit is selling tissue culture-derived date palm cultivars all year round at the according to the highest standards and specifications as follow:

1- Identical to the variety parent (true to type).
2- Disease and pest-free (pathogen-free).
3- Rapid growth compared to traditional offshoots.
4- Strong, healthy and dense root systems.
5- Possible 100% cultivation success.