

Organic Farming of Date Palm and Recycling of Their Wastes

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Abstract: Organic farming of date palm systems represents the optimum solution for sustainable date palm production through the use of organic fertilizer (compost), biofertilizers and biological control agents. Organic agriculture includes all agricultural systems that promote the environmentally, socially and economically sound production of food. Organic farming dramatically reduces external inputs by avoiding the use of chemosynthetic fertilizers and pesticides. Organic farming of date palm on national, regional and international levels will increase and improve fertility and productivity of the soil, improve the production of high quality date palm, and decrease the production costs. The methods and the use of organic fertilizers (compost), biofertilizers (nitrogen fixing bacteria, phosphate dissolving microorganisms and biological potassium microorganisms) as well as bio control agents will be discussed. The waste recycling process of date palm is not a new technology, yet it is considered the most important biological process within the environmental system that aims to keep the environmental balance. Biological reactions are one of the safest and most successful methods, in which microorganisms can play an important biological role and restore the balance within the environmental system, in addition to their success in transforming date palm wastes to products of an economic return. Regarding the dates falling during early stages of growing, pickling processes will be discussed, too. Another important issue is the field of industrial fermentation which produces organic acids, ethanol, and yeasts from date residual industry. The role of date palm by-products which can be recycled into high quality compost and other useful products is considered as well. The main purpose of this paper is to improve the environment keeping its balance and protecting it against pollution threats in order to raise the standard of living of farmers and to encourage the settlement of desert areas.

Introduction

Why organic farming?

1. Protect the health of future generations
2. Protect water quality
3. Build and protect top soil.
4. Meet stringent standards.
5. Reduce potential health risks.
6. Preserve biodiversity.
7. Keep rural communities healthy.
8. Protect the health of farm workers.
9. Represent a true economy.
10. Make food taste great.

What is organic farming?

Organic farming refers to the agricultural systems used to produce food and fiber. Organic farming systems do not use toxic chemical pesticides or fertilizers. Instead, they are based on the development of biological diversity and the maintenance and replenishment of soil fertility.

What does certify 'organic' mean?

Certification includes inspection of farm field and processing facilities. Farm practices inspected include long term soil management buffering between organic farming and any conventional farms, product labeling and record

keeping. Processing inspections include review of the facilities, cleaning, pest control methods, ingredient transportation, storage and record keeping as well as audit control

Compost

The branches: These are the long twigs that contain the fronds and spikes the number of date palms branches varies between 30 - 150, leaves, also called the "fronds". They look like feathers with about 120 -240 on each branch, about 10% /year. Instead of burning them, their wastes can be utilized to produce a good quality of compost.

Organic wastes are decomposed, and through composting, nutrients are made available to plants, while pathogens are destroyed and malodors are abated.

Methods and factors affecting the composting process:

1. **Materials used:** Crop residues, date palm wastes, animal wastes and bio-fertilizers are considered the main resources available for composting.
- 2- **Nutrients and C: N ratio:** An optimum C:N ratio is around 10 -12 to obtain a good microbial growth
- 3- **Micro-organisms:** Many mesophilic and thermophilic bacteria, fungi and actinomycetes are metabolically active during composting process

- 4- **Particle size:** Shredding or grinding the raw materials for composting can produce several beneficial results .The best size is less than 5 cm.
- 5- **Temperature:** During composting, temperatures increase to 60 °C in a few days and reach to 80 °C. The self-heating temperature is a very important factor for composting.
- 6- **Aeration:** The critical oxygen concentration is around 15%.
- 7 – **Moisture:** Moisture content between 50% - 60% seems the optimal.
- 8- **PH:** The optimal pH values vary between 6 and 8

Composting

Composting is a living process that depends on the metabolic activities of a wide variety of microorganisms. During composting process, microorganisms generate substantial heat. The heat from this biological fire can cause dramatic temperature increases in the composting materials. Composting also degrades a portion of the fiber in wastes, and mixing and shredding break down the physical structure. These processes produce compost that is both chemically and physically homogeneous, which is an important quality in the horticultural industry.

Bio-fertilizers and organic farming approaches

Bio- fertilizers are considered to be low cost, eco- friendly and renewable sources of plant nutrients supplementing chemical fertilizers in sustainable agricultural systems. This refers to microorganisms, which increase crop growth through different mechanisms including biological nitrogen fixation, and growth –promoting hormonal substances which increase availability of soil nutrients,

B. Utilization of dates in the industrial fermentation field

Residuals of date factories are among the best food stuffs exposed to fermentation because they are rich in sugars, vitamins and mineral ingredients in addition to other non-organic substances.

- 1- Production of organic acids such as citric acid, formic acid, butyric acid
- 2- Production of ethyl alcohol.
- 3. Production of acetic acid and acetone
- 4. Production of bakers yeast
- 5. Production of food yeast
- 6. Production of feed yeast

C. Recycling of date palm seeds

Chemical Components of Date Seeds

| | |
|---------------|--------|
| Moisture | 6.5 % |
| Carbohydrates | 62.5 % |
| Fats | 8.5 % |
| Proteins | 5.2 % |
| Minerals | 1.1 % |
| Oils | 7-8 % |

Nitrogen fixing microorganisms, phosphate dissolving microorganisms and biological potassium microorganisms.

Biological control

The field of biological control has many aspects; it is the action of parasites, predators and insects in maintaining other organisms population at lower average density.

Examples of biological control research in date palm

Organic agriculture is among the broad spectrum of production methods that are supportive of the environment. Organic production systems are based on specific and precise standards of production which aim at achieving agro-ecosystems which are socially and ecologically sustainable.

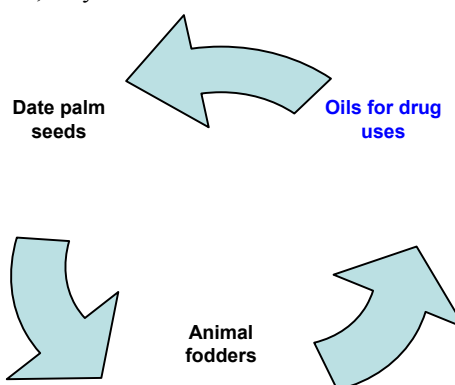
."Organic" is a labeling term that denotes products that have been produced in accordance with organic standards throughout production, handling, processing marketing stages, and are certified by a duly constituted certification body or authority.

A. Pickling processes

Regarding fallen dates during early stages of growing, we can make use of these dates, through the pickle industry, in spite of their palatable taste which is caused by astringent and bitter protoplasm.

They could be treated the same way as green olives because they are very similar in shape, color and taste.

It is known that the pickle industry is considered an important means of food preservation in the food processing using highly concentrated salts, without the need for using any chemical preservation.



Production of animal fodders through grinding of seeds.
Extraction of date seed oil for medical purposes which is used for healing some skin diseases.

References

- Barreveld, W.H. 1993. Date Palm Products, Agricultural Services Bulletin No 101, 216pp, FAO Rome.
- Osman, A.M. 1995. Date palm production and protection in the Arab Countries. Expert consultation on date palm-
الصناعات القائمة علي فاقد ومخلفات التمور (شحاتة عبد الفتاح – القاهرة –
1995)- الإدارة العامة للثقافة الزراعية – وزارة الزراعة – جمهورية
مصر العربية
- pest problems and their control in the Near East. 22-26
April 1995, Al-Ain, UAE.
- Ogaidi, AL., H. K. H., Muslh,R., Ali u. M. 1988. Isolation
and identification of some Iraqi local ethanol producing
yeasts grown on date juice .Date Palm Journal (2) 6.
- التقنية الحيوية الميكروبية والتمور (حسن خالد حسن العكدي بغداد 1987)
المركز الإقليمي لبحوث النخيل والتمور في الشرق الأدنى وشمال إفريقيا