ORGANIC DATE AND BIOINTENSIVE IPM

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Abstract

Organic date is one of food produced organically which have seen an increased demand during recent years not only globally but also in the Arab countries. Dates shall refer to organic production only if they come from a farm system employing the practices of transition, production, pest management, preparation and handling in accordance with the valid standards. This standard applies to the unprocessed and processed products that carry or are intended to carry descriptive labelling referencing organic production methods. When the organic management practices alone cannot prevent or control crop pests, disease or weeds, a biological or botanical substance, or other substances may be applied through biointensive IPM programs. Consequently, biointensive IPM is not just about management of pests alone, it is a sustainable crop production based on sound eco-system analysis. However there are certain challenges that constrain its wide range implementation in Arab region. This paper focus on the need to overcome these constrains and planning as well as implementation of bio-intensive IPM program in organic date palm farms.

Key words: *Organic date, Pests, Biointensive IPM, Arab region.*

INTRODUCTION

Dates shall refer to organic production only if they come from a farm system employing management practices that seek to nurture ecosystems in order to achieve sustainable productivity; and that provide weed, pest and disease control through a diverse mix of mutually dependent life forms, recycling of plant and animal residues, crop selection and rotation, water management, tillage and cultivation (4). This standard applies to the unprocessed and processed products that carry or are intended to carry descriptive labelling referencing organic production methods. A product will be regarded as bearing indications referring to organic production methods where, in the labelling or claims, including advertising material or commercial documents, the product or its ingredients are described by the terms *organic, biodynamic, biological* and *ecological* or by words of similar intent, including diminutives, which suggest to the purchaser that the product or its ingredients were obtained according to organic production methods. Some Arab producers have diversified into organic production of dates. For example, Tunisia export certified organic dates to the European countries. The main market is Germany. Tunisia

exported 678 tonnes of organic dates (The official production Figure was 107 000 tonnes for all varieties) in 2000-2001, up 60 percent from 425 tonnes in the previous season. Although Tunisia accounts for only 2 percent of world date production, its share of global exports in value is 21 percent. It represents 55 percent of EU imports in value. Tunisia exports about the same quantity of processed and natural dates. Algeria came the second with a market share of 20 percent of EU imports in value. The official production Figure in 2000 was 365 000 tonnes for all varieties Algeria exports more natural dates than processed dates, as there is a lack of processing capacity. The quasi-totality of Algerian dates is destined for France.

Most of pest control operations employing pesticides are either restricted or not permitted not only in organic date but also at all in organic products. Crop production and pest control methods in organic agriculture are governed by strict standards and rules imposed by the International Federation of Organic Agriculture Movement (IFOAM) and national regulations. The principles of pest control in organic farming are based on: (i) prevention of infestation, (ii) avoiding the contamination of organic foods by any form of infestation, (iii) avoiding any contamination of organic foods with plant protection products, and (iv) the use of substances which not adversely affect the environment. Consequently, IPM is not just about management of pests alone, it is a sustainable crop production based on sound eco-system analysis. However there are certain challenges that constrain its wide range implementation (3&7).

This paper focus on the need to overcome these constrains and implementation of bio-intensive IPM for organic dates in Arab region.

Possible causes of date palm damage in organic farming

The date palm and its fruits are subject to attacks by several pests that are, in most cases, well adapted to the oasis environment. Damage caused by pests is considerable and leads to heavy economic losses. Possible biotic as well as abiotic causes of date palm damage (date palm disorders) are listed in Table (1).

Table 1. Possible Causes of Date Palm Damage

Biotic		Abiotic		
Animal	Vegetal	Environmental factors		Physiological& Propagation disorders
Insects	Fungi	Physical	Human activity	Propagation disorders
Mites	Phytoplasmic causes	Mineral deficiencies	Phytotoxicity (Herbicide toxicity)	
Nematodes	Unknown	Frost damage	Soil salinity (Salt stress)	Physiological disorders
Snails/ Slugs Birds/ Mammals (Bats/Rodents)	Weeds	Moisture stress/ Drought/ Others	Machinery damage	

Pest management and unprocessed, processed organic date products

The use of the term *organic*, and similar terms having the same meaning, is permitted on the principal display panel of a product, provided that 95% or more (by mass or fluid volume, excluding water and salt) of the ingredients are obtained from sources of organic production in accordance with the valid standards. The non-organic ingredients are allowed for use to within a maximum level of 5% (by mass or fluid volume, excluding water and salt) of the totai ingredients in the final product if they are not commercially available in an organic form, and the cost of organic ingredient(s) is not to be used as a criterion for *commercially available*. All organic ingredients contained in the final composition of a product certified by a certification body shall have also been certified. Products containing 70 to 95% or more (by mass or fluid volume, excluding water and salt) of agricultural ingredients that are organic in accordance with the valid standards shall be labelled on the principal display panel as "Contains X % organic" (specify the ingredients), where the actual organic ingredient is in accordance with this standards.

Pest, disease and weed control shall be centred on organic management practices aimed at enhancing crop health and minimizing losses caused by weeds, disease and pests. When the organic management practices alone cannot prevent or control crop pests, disease or weeds, a biological or botanical substance, or other substances may be applied (11). However, the conditions for using the substance shall be documented in the organic plan. The following considerations are essentials:

1- Good manufacturing practices shall be adopted to prevent pests. Pest management practices shall first involve the removal of pest habitat and food; second, the

prevention of access and environmental management (light, temperature and atmosphere) to prevent pest intrusion and reproduction; and third, mechanical and physical methods (traps), permitted lures and repellents.

2- If these practices are ineffective, the operation may use the permitted pest control substances listed. The operator shall, however, ensure that any pest control substance used does not come in contact with the organic product, and shall record the use and disposition of all such substances.

3- The use of pesticides not listed for post harvest or quarantine purposes shall not be permitted on products prepared in accordance with the valid standard and shall cause organic products to lose their organic status.

Prohibited substances, methods or ingredients in organic date production and handling

When producing or handling organic products sold or labelled as being products whose content is partially or wholly organic, it is forbidden to use any of the following substances or techniques:

1- All materials and products produced from genetic engineering as these are not compatible with the principles of organic production (growing, preparing and selling) and therefore are not accepted under this standard

2- Synthetic pesticides (e.g. defoliants and desiccants, fungicides, insecticides and rodenticides), wood preservatives (e.g. arsenate) or other pesticides.

3- Fertilizer or composted plant and animal material that contains a prohibited substance.

4- Sewage sludge, in any form, as a soil amendment

5- Synthetic growth regulators

6- Synthetic allopathic veterinary drugs, including antibiotics and parasiticides.

7- Synthetic processing substances, aids and ingredients, and food additives and processing aids including sulphates, nitrates and nitrites.

8- Ionizing radiation and forms of irradiation on products destined for food or their inputs.

9- Equipment, packaging materials and storage containers, or bins that contain a synthetic fungicide, preservative or fumigant.

10- Substances that is not included in valid standards.

Planning the program and Successful Implementation of Biointensive IPM

The high – level IPM adoption where farmers have integrated multiple preventive practices to control pests without relying on pesticides is the most advanced IPM and termed as the bio intensive or bio IPM (Fig.1). An important

difference between conventional and biointensive IPM is that the emphasis of the latter is on proactive measures to *redesign* the agricultural ecosystem to the disadvantage of a pest and to the advantage of its parasite and predator complex (2& 12). At the same time, biointensive IPM shares many of the same components as conventional IPM, including monitoring, use of economic thresholds, record keeping, and planning. When planning a biointensive IPM program, some factors include: options for design changes in the agricultural system (beneficial organism habitat, crop rotations), choice of pest-resistant cultivars, technical information needs, monitoring options, record keeping and equipment should be considered (5).

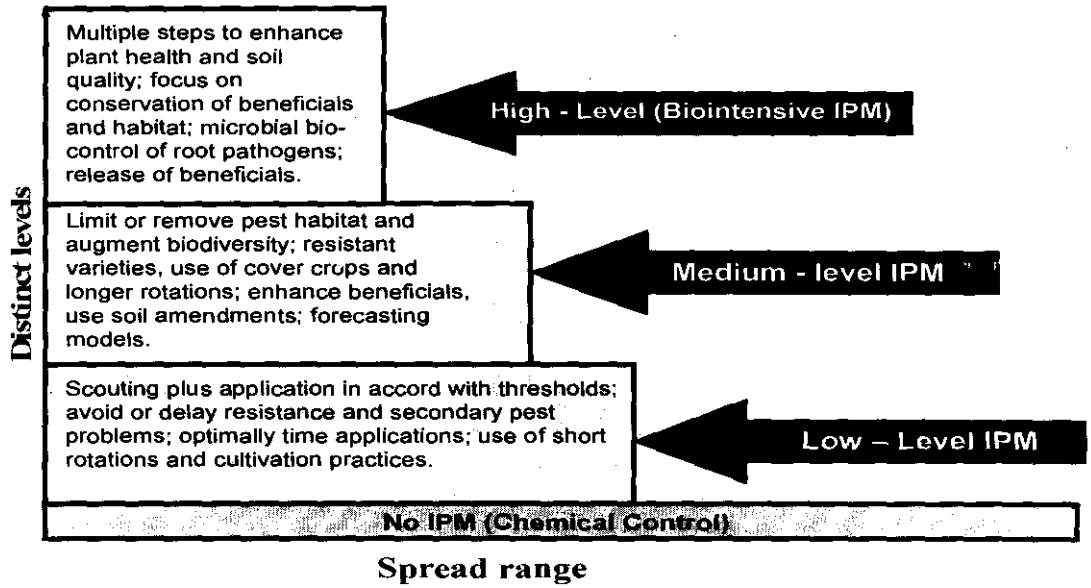

Fig.1 Categories of IPM adoption in Arab region (Source from: 5).

Biointensive integrated pest management (bio IPM) is a system approach to pest management that is based on an understanding of pest ecology (2, 8& 10). It begins with steps to accurately diagnose the nature and source of pest problem, and then relies on range of preventive tactics and biological measures to keep pest populations within acceptable limits (1). Reduced risk pesticides are used if other tactics have not been adequately effective, as a last resort and with care to minimize risks. Generally, IPM systems must respond to and or affected by several factors: economic costs and benefits of individual components; emergence of new pests, resistance or unusual weather problems; the skill and competence of field personnel conducting scouting, designing tactics and assessing effectiveness of given strategies; the impact or importance of preventive practices; availability, or lack thereof of

effective alternative pest management products; and the complexity of interactions among pests, beneficials, cropping practices and control measures. Moreover, all IPM programs regardless of the situation, share the following components: monitoring the pest population and other relevant factors; accurate identification of the pest; determining injury levels and threshold that trigger treatment; timing treatments to the best advantage; spot-treating for the pest; selecting the least – disruptive tactics; evaluating the effectiveness of treatment to fine –tune future actions and educating all people involved with the pest problem (6).

Good planning must precede implementation of any IPM program, but is particularly important in a biointensive program. Planning should be done before fruting season because many pest strategies require steps or inputs, such as beneficial organism habitat management that must be considered well in advance (9). Attempting to jump-start an IPM program in the beginning or middle of a season generally does not work. IPM options may be considered proactive or reactive (Fig.2).

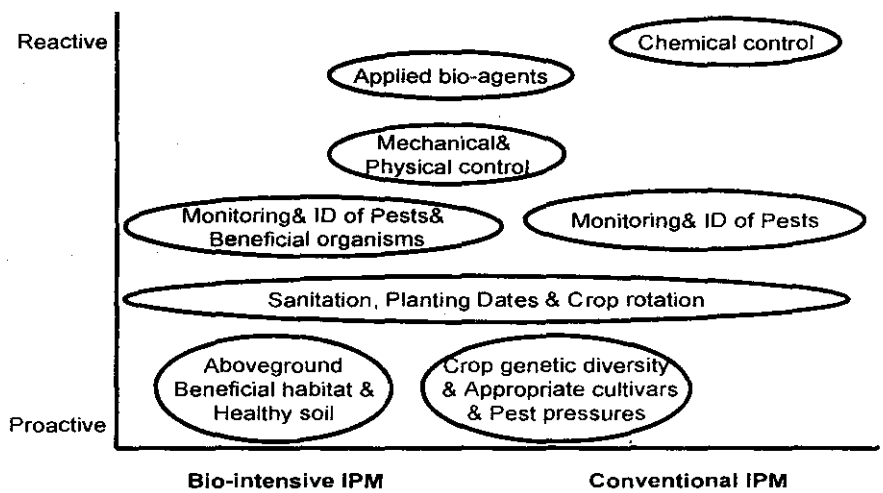

Fig. 2. Proactive and reactive options of IPM (Adapted from: ATTRA)

PROACTIVE PEST MANAGEMENT OPTIONS

Proactive options need to answer the following questions regarding agricultural ecosystem management, pest- resistant cultivars, IPM technical information, monitoring options, pest monitoring equipment and record – keeping when planning IPM program:

Agricultural Ecosystem Management

- What effects does soil quality have on plant attractiveness and susceptibility to insect pests and damage? (Fore example, are "dead soils" creating a pest problem through lack of balanced plant nutrition?) What are options for better soil management (cover crops, green manures, adding compost, reduce tillage, etc)
- What cultural or habitat options can be implemented before the crop is planted?
- What are crop rotation options and their effect on pest management (insects, weeds and plant pathogens)?
- What are cover crop options and their effect on pest management?

Pest- resistant cultivars

Cultivars should be resistant to major pest(s), appropriate for the area, commercially available, should have appropriate mode of resistance and must have a market.

IPM Technical Information

- Develop sources for biointensive IPM information and information about cropping systems ecology, farmscaping and ecological soil management
- Check with state or country extension for the latest IPM program for a particular crop (date palm)/ pest complex
- IPM program should establish an Economic Injury Level (EIL) for major pests, including (ideally) weeds
- How do major pest EILs change with time and how does this influence management practices?

Monitoring options

- What is the purpose of monitoring: To determine number of pests present, stage of development, type of damage being done, injury levels, or to time treatments?
- Which pests& beneficials will be sampled? What are the key pests and their natural enemis?
- What sampling method will be used?
- What other factors should be monitored? Consider conditions that may increase or decrease severity of pest problems, such as soil moisture, soil nutrient status, temperature, humidity, stage of crop development.

Pest monitoring equipment

- Determine types of equipment needed: pheromone traps, sweep nets, hand lens, D-VAC™, etc. A PCA will have much of this information.
- Determine sources of equipment.

PROACTIVE STRATEGIES

Cultural control

Healthy, biologically active soils (increasing belowground diversity)? Habitat for beneficial organisms (increasing aboveground diversity)? Appropriate plant cultivars?

Biological control

Biological control is the use of living organisms —parasites, predators, or pathogens—to maintain pest populations below economically damaging levels, and may be either natural or applied. A first step in setting up a biointensive IPM program is to assess the populations of beneficials and their interactions within the local ecosystem. This will help to determine the potential role of natural enemies in the managed agricultural ecosystem. It should be noted that some groups of beneficials (e.g.,spiders, ground beetles, bats) may be absent or scarce on some farms because of lack of habitat. These organisms might make significant contributions to pest management if provided with adequate habitat.

Mechanical and physical controls

Methods included in this category utilize some physical component of the environment, such as temperature, humidity, or light, to the detriment of the pest. Common examples are tillage, flaming, soil solarization, and plastic mulches to kill weeds or to prevent weed seed germination.

Pest Identification

A crucial step in any IPM program is to identify the pest. The effectiveness of both proactive and reactive pest management measures depend on correct identification. Misidentification of the pest may be worse than useless; it may actually be harmful and cost time and money. Help with positive identification of pests may be obtained from university personnel, private consultants, the Cooperative Extension Service, books and websites.

Monitoring

Monitoring involves systematically checking crop fields for pests and beneficials, at regular intervals and at critical times, to gather information about the crop, pests, and natural enemies. Sweep nets, sticky traps, and pheromone traps can be used to collect insects for both identification and population density information. Leaf counts are one method for recording plant growth stages. Square-foot or larger grids laid out in a field can provide a basis for comparative weed counts. Records of rainfall and temperature are sometimes used to predict the likelihood of disease infections.

Economic Injury and Action Levels

The economic *injury* level (EIL) is the pest population that inflicts crop damage greater than the cost of control measures. Because growers will generally want to act before a population reaches EIL, IPM programs use the concept of an economic *threshold* level (ETL or ET), also known as an action threshold. The ETL is closely related to the EIL, and is the point at which suppression tactics should be applied in order to prevent pest populations from increasing to injurious levels.

REACTIVE PEST MANAGEMENT OPTIONS

Since, IPM requires continuous assessment of a situation (12), there are certain key question that must be answered before implementing any management strategy such as: Is treatment necessary? What are the alternatives to prohibited substances that can inhibit pests? What are commercial sources for these alternatives? Where should the treatment talk place? When should action be taken? and Which tactics should be used? The answer of these questions required to emphasize that the mere presence of a pest doesn't necessarily warrant treatment. Some times a fairly large population of pests can be tolerated while other times the presence of a single pest is intolerable. In addition, the determination in treatment will vary among individuals. Also, pest managers must look to the whole system to determine the best place and timing to solve the problem. A successful IPM program is based on taking "a whole system" or eco-system approach to solve a pest problem (8). We must think of both the living and non-living components when determining which approach to take, and each component has impact on every other component (1).

Choosing practices/ tactics

Organic control practices for the main pests (i.e. insects, diseases and weeds) are based on non-chemical sanitation, physical, mechanical, cultural, and biological means as well as organically permitted products includes approved chemicals. Since no single practice is effective for all possible pests that threaten the crop, a combination of such practices is necessary. The successful management of insect pests includes pest prevention, early detection, correct identification, proper selection of control techniques and correct application methods (9&10). During the growing season there are number of practices to maintain healthy plants include adequate fertilizing, irrigation and mulch. Preventive devices, sticky colored yellow, black light and pheromone traps are excellent trapping techniques and can be used as survey tools, and may be offer protection to plants. These practices could be make fields unattractive to pest species. However, at times this may be not enough when the

levels of pest populations or damage are not acceptable. The use of bio-pesticides includes microbial products, botanicals and biochemical substances in these cases are necessary practice (Table 2).

RECORD – KEEPING AND PROGRAM EVALUATION

- Keep field maps, and record the history of fields, the problems that recur every year and where, the most problematic fields or sections of fields.
- Develop a record – keeping system that is user- friendly and "field- friendly". Evaluate available software options.
- Develop a method of displaying monitoring information that will facilitate decision-making. Evaluate available hardware and software options.
- All components of the IPM system- soil management, habitat management, pest/ beneficial monitoring, decision- making (including EIL's) and treatments- should be evaluated for overall efficacy, Are the most recently - developed EIL's and action thresholds being used?
- The IPM system should be modified and continually fine- tuned after evaluation.

Table 2. Permitted and restricted pest management tools in organic farming.

Permitted	- Botanical products.
- Carbon dioxide, nitrogen, freezing, heating and vacuum treatment.	- Microbial products.
- Mechanical, sound or light barriers.	- Organically approved chemicals (Bordeaux mixture, sulfur and copper)
- Electric flying insect control units.	Restricted
- Tamper resistant bait stations.	(Substances used only in case of immediate threat to organic foods becoming unfit for consumption due to infestation)
- Pheromone traps & sticky boards.	- Pyrethrum derived only from a natural source.
- Diatomaceous earth & amorphous silica.	- Synthetic pyrethroids for the treatment of sealed units.
- Particle film barriers (processed kaolin clay).	
- Sugar esters	
- Compost teas.	

CONCLUSIONS

Overcome of IPM constrains and improve the effectiveness of current programs is needed. Furthermore, new systems for organic agriculture need to be designed, where the crop environment discourages pest development. Also, the role of training of organic farmers and farm groups should be emphasized as key feature of successful

programs in learning and implementing new practices. Meanwhile the IPM continuum could be achieved according to the following action plan:

1- Define an appropriate IPM continuum for the country or the region.
2- Establish at what stage we are now.
3- Establish realistic objectives in consultation with all stakeholders.
4- Recommended action to industry and to government.
5- Establish new positions of crop management specialists.
6- Recruit a professional with research and extension expertise in the area of bio - intensive IPM.

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التمر العضوي والإدارة المتكاملة للآفات مكثفة الحيوية

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التمر العضوي أحد الأغذية المنتجه عضويا التي شهدت السنوات الأخيرة تزايدا ملحوظا للطلب عليها ليس فقط علي المستوي العالمي، ولكن أيضا علي مستوي البلاد العربية. وتصنف التمور كمنتج عضوي فقط إذا ماكانت ناتجة عن نظام مزرعي توظف فيه اجراءات التحول، الانتاج، إدارة الآفات، الإعداد، والتداول تبعا لمقاييس موثقة أو متفق عليها. وتطبق هذه المقاييس سواء علي التمور غير المصنعة أو منتجاتها المصنعة التي تعد لكي تحمل الملصق الدال علي أنها منتجة تبعا للمقاييس العضوية. وعندما لاتستطيع إجراءات الإدارة العضوية المتبعة في المزرعة تجنب أو مكافحة الآفات، الأمراض أو الحشائش فإن أحد المواد الحيوية أو النباتية المنشأ أو غيرها من المواد المسموح بها يمكن استخدامها من خلال برامج الإدارة المتكاملة مكثفة الحيوية، وعلي ذلك فإن الإدارة المتكاملة مكثفة الحيوية ليست لمجرد إدارة الآفات فقط، ولكنها لانتاج محصولي مستدام مبني علي أسس التحليل البيئي. وحيث أن هناك بعض التحديات التي تعوق تنفيذها علي نطاق واسع بالمنطقة العربية، فإن هذه الدراسة تركز علي الحاجة للتغلب علي هذه المعوقات، وتخطيط وتنفيذ برامج الإدارة المتكاملة مكثفة الحيوية بمزارع نخيل التمر العضوي.

كلمات دالة: التمر العضوي، الآفات، الإدارة المتكاملة مكثفة الحيوية، المنطقة العربية