



Guidance Document on Integrated Pest Management in the Maltese Islands

2015

Contents

Introduction	3
Prevention and suppression of harmful organisms	7
Monitoring	12
Non-chemical measures	15
Protection of bees	18
Protection of water.....	21
Protection of human health	24
Disposal	27
Record keeping	29
Check list	31
Annex I	34
Annex II	36
Annex III	38

Introduction

Integrated Pest Management is regulated by Legal Notice 489 of 2011, Sustainable Use of Pesticides Regulations, 2011. This is defined by the same Legal Notices as careful consideration of all available plant protection methods and subsequent integration of appropriate measures that discourage the development of populations of harmful organisms and keep the use of plant protection products and other forms of intervention to levels that are economically and ecologically justified and reduce or minimise risks to human health and the environment. Integrated pest management emphasises the growth of a healthy crop with the least possible disruption to agro-ecosystems.

The General principles of integrated pest management intend to prevent and, or suppress harmful organisms and this should be achieved or supported among other options especially by:

- crop rotation,
- use of adequate cultivation techniques (e.g. stale seedbed technique, sowing dates and densities, under-sowing, conservation tillage, pruning and direct sowing),
- use resistant grafting, especially where a susceptible cultivar is grafted on a resistant rootstock, as is the case with tomatoes, melons, vines etc.
- use, where appropriate, of resistant/tolerant cultivars and certified seed and other propagation material and standard/certified seed and planting material,

- Netting should be used in greenhouse and where appropriate on agricultural crops.
- preventing the spreading of harmful organisms by hygiene measures (e.g. by regular cleansing of machinery and agricultural equipment with appropriate disinfectants),
- eradication of any plants which seem to be infected, in order to reduce the spread of diseases.
- People entering greenhouses need to wipe their shoes in a disinfected medium
- use of balanced fertilisation, liming and irrigation/drainage practices,
- preventing the spreading of harmful organisms by hygiene measures (e.g. by regular cleansing of machinery and equipment),
- protection and enhancement of important beneficial organisms, e.g. by adequate plant protection measures or the utilisation of ecological infrastructures inside and outside production sites.

Harmful organisms must be monitored by adequate methods and tools, where available. Such adequate tools should include observations in the field as well as scientifically sound warning, forecasting and early diagnosis systems, where feasible, as well as the use of advice from professionally qualified advisors.

Based on the results of the monitoring the professional user has to decide whether and when to apply plant protection measures. Robust and scientifically sound threshold values are essential components for decision making. For harmful organisms threshold levels defined for the region, specific areas, crops

and particular climatic conditions must be taken into account before treatments, where feasible.

Sustainable biological, physical and other non-chemical methods must be preferred to chemical methods if they provide satisfactory pest control.

The pesticides applied shall be as specific as possible for the target and shall have the least side effects on human health, non-target organisms and the environment.

The professional user should keep the use of pesticides and other forms of intervention to levels that are necessary, e.g. by reduced doses, reduced application frequency or partial applications, considering that the level of risk in vegetation is acceptable and they do not increase the risk for development of resistance in populations of harmful organisms, other cultural practices.

Where the risk of resistance against a plant protection measure is known and where the level of harmful organisms requires repeated application of pesticides to the crops, available anti-resistance strategies should be applied to maintain the effectiveness of the products. This may include the use of multiple pesticides with different modes of action and by using other cultural practices, such as mechanical methods (elimination) or the use of traps.

Based on the records on the use of pesticides and on the monitoring of harmful organisms the professional user should check the success of the applied plant protection measures.

Prevention and Suppression of Harmful Organisms

Prevention and Suppression can be attained through a number of activities carried out at the field. Where possible, the underneath methods should be included in the every day to day running of the entity:

1. Crop Rotation

Crop rotation is a systemic approach for the reduction of pests and diseases, thus minimizing the application of pesticides. The underneath shows a typical example of crop rotation in a field, where different crops are grown one season after the other.



2. Stale seedbed technique

A stale seedbed technique is the preparation of an area where the main crop is intended to be sown. Prior to sowing the soil is rotavated and left empty for a period of time. This will give the chance to any weed seeds to germinate and grow. Once the weeds start growing the area is deweeded. It is important to ensure that the deweeding is carried out at the

appropriate time so as to avoid the risk of further spreading of weed seedlings. After deweeding the crop can be sown. The practice is intended to minimize the use of herbicides.

3. Soil sterilization

Prior to the plantation of new crops, the sterilization of soil through solar sterilization is a very effective method to prevent the presence of pests and diseases which may still be present in the soil. Such a method would also be an effective method to get rid of weed seeds which would be present in the soil.

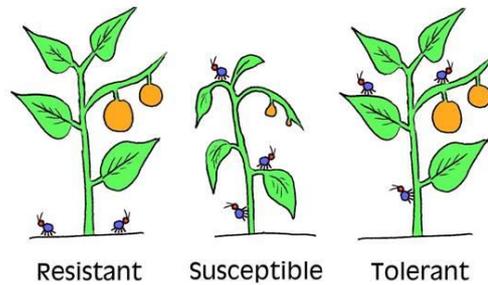
4. Sowing dates, densities and under sowing

Sowing dates can have a considerable impact on the prevention of infestations, due to the alteration of the growing cycle of the plant and the development cycle of the insect. Depending of the particular crop and season the early or late sowing of the crop will decrease the need for use of insecticides.

Under sowing is a technique which diminishes the risk of fungal infections. The high levels of humidity and the high temperatures on the Maltese Islands provide an ideal climate for fungi to nourish. Under sowing will assure that all foliage has adequate ventilation and thus wet foliage will dry out more quickly during the day time. This will diminish the need to use fungicides throughout the growing season.

5. Use, where appropriate, of resistant/tolerant cultivars and standard/certified seed and planting material.

Where possible, resistant/tolerant cultivars should be used. Seed and other propagation material and planting material should always be certified as healthy and of high quality



according to the national and international legislations relevant to plant health and marketing of plant reproductive material. The use of such cultivars, seeds and other propagation material and planting material will ensure that the tree / plant will thrive more in the local conditions and thus less use of pesticides will be necessary.

6. Use of soil analyses, balanced fertilisation and irrigation/drainage practices.

Where necessary, soil should be analysed for any diseases which may be present. In addition, the appropriate amount of fertilisation, irrigation and drainage will impact the amount of foliage present on the crop. Excessive foliage will only act as a host for pests and diseases. Farmers should have available a fertilisation plan for their field according to the particular crop so as to determine the amounts, if any, of fertilisation needed.

7. Hygiene Measures

Farmers should make sure that pruning tools are cleaned using basic disinfectants and a wet sponge/cloth from one tree to the other. In addition they should make sure that appropriate measures are taken for the maintenance of hygiene in machinery, storage rooms and boxes. Particular attention should be paid to machinery which is used in different fields. Lack of hygiene in such machinery will only spread pests and diseases from one field to another, thus increasing the requirements for the use of pesticides during the growing season.

Plant products stored in boxes and rooms should be stored in clean boxes free from debris of previous products and in clean rooms, so as to diminish the need for use of pesticides after the harvesting of the plant products.

8. Green Manuring

In general, the incorporation of large amounts of organic matter into the soil reduces populations of plant-feeding nematodes. The decomposition products of some plants kill nematodes. These include isothiocyanates, released during the decomposition of certain crops in the *Brassica* genus. Green manure treatments are not equally effective against all plant-parasitic nematodes and therefore it is important to consult with a diagnostic lab or adviser to make sure the treatment is appropriate for the nematode being controlled.

Monitoring

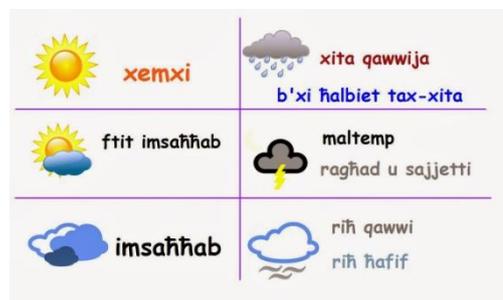
1. Monitoring of Crops

Regular monitoring of crops remains the best systems to monitor any infestations of pests or diseases on the crop. The latter are then treated on the presence or otherwise of infestations and according to the threshold levels. Where unrecognised symptoms are identified these should be brought to the attention of Plant Health Department and tested to determine the type of pest present. The use of stickers is highly recommended.

One should, however take into consideration those situations where a proactive approach is necessary. A practical example to this would be the blight (*Phytophthora infestans*) in potatoes, where a preventive treatment would be a more suitable approach since it would be too late to safeguard the product once it is present. In certain situations when climatic or other pressuring conditions increase risk of disease or infestation it is suggested to apply a preventive treatment with non systemic pesticides.

2. Weather Forecast

Weather has a major influence on the development of pests and diseases. Weather should also be considered before applying treatments since this might influence how effective the



particular treatment would be. A practical example would be the forecast of rain during a planned pesticide application. It could also influence the

type of pesticide use due to the likelihood of presences of pests and diseases in particular weathers.

3. **Monitoring and Identification of pests.**

Regular monitoring of pests is an important tool for the efficient use of pesticides.

Practical example of monitoring trap is that of the *Tuta Absoluta* in tomatoes. Traps should be used on a regular basis by farmers to



monitor the type and quantity of infestations in the field. It is important that a thorough and correct identification of insects caught in trap is made. If the farmer is unable to do so him/herself s/he are advised to resort to technical advice through Farm Advisory Services.

Non Chemical Measures

Where economically and agronomically feasible non-chemical measures should be given preference over chemical treatments. The following non-chemical measures should be used when possible:

1. Use of mulching

The use of mulching, should be taken into consideration before the application of herbicides. Besides reducing the incidences where herbicides would need to be used, the resorting to mulching is also very helpful for the maintenance of good soil quality.



2. Manual / Mechanical Deweeding

When possible and economically viable, manual / mechanical deweeding should be given preference over chemical deweeding. Nonetheless care should be taken for those weeds which through manual / mechanical deweeding would further spread the seeds. Timing is very important and so is the knowledge of which weeds would be more viable to treat chemically rather than manually / mechanically. Such a measure would help in the root structure of certain crops such as in vines where ploughing is more likely to disrupt their structure.

3. Use of nets

When possible, farmers should make use of nets to protect plants or plan products from



attacks and infestations. When appropriate, for greenhouses, vines and other crops should be covered with netting to avoid the products being destroyed by birds. When possible, netting should be white since these are more easily seen by birds and will reduce risks of birds flying into the nets and ending up entangled. The use of avicides is not permissible.

Protection of Bees

Bees play a vital role in the survival of agricultural activity and availability of food and feed for humans and animals. The following, mitigation measures should be followed on a regular basis to ensure the safeguarding of bees:

1. Use of pesticides which are not toxic to bees.

If more than one pesticide product is effective for the control of the same infestation the one which is less toxic to bees should be used. Preference should be given to pesticide formulations which are either in granular forms or in emulsifiable concentrate. Dusts and encapsulated pesticides are more toxic than pesticides of the same material while wettable powders tend to have more residual effect and their use should thus be limited as much as possible.

2. Timing of application

- Pesticide application should be carried out during the times when bees are less likely to be actively foraging i.e. early morning or in the evening.
- Pesticide drift should be avoided as much as possible, through either drift reducing equipment and by ensuring that application of pesticides is carried out in the absence of strong winds.
- Due to the fact that the presence of bees is higher during the flowering period, the application of pesticides during this time should be avoided unless absolutely necessary. Flowers of weeds should be removed before the application of pesticides.

3. Notification to bee keeper

When using pesticides which are toxic to bees the professional user shall notify any beekeeper in close proximity of the area being treated, so that he may move or protect the



hives or confine bees if potential bee losses may occur.

Protection of water

The most efficient application techniques such as the use of low-drift pesticide application equipment should be used especially when these are applied on vertical crops such as orchards and vineyards. Off-site pollution caused by spray drift, drain-flow and runoff should be minimized through use of mitigation measures which include the use of the underneath mentioned buffer zones for the protection of non-target aquatic organisms and safeguard zones for surface and groundwater used for the abstraction of drinking water. In addition applications along roads and very permeable surfaces or other infrastructure close to surface water or groundwater or on sealed surfaces with a high risk of run-off into surface water or sewage systems should be drastically minimized or eliminated.

Plant Protection Products applications should respect the following:

- Should not be applied on any type of freshwater path;
- A minimum distance of 5 meters from passages of natural waters;
- A minimum distance of 5 meters from streams, boreholes, and cracks in rocks;
- A minimum distance of 30 meters from boreholes used for the provision of water to the public;
- A minimum distance of 30 meters from the coast and bathing waters. Special attention should be paid to bystanders, Pesticides should be applied at times of lowest human activity wherever possible.

Plant Protection Products should be stored according to the Good Plant Protection Practice namely:

- Storage of plant protection products should be limited to the necessary minimum in time and amount;
- Plant Protection Products on site should still be authorised for placing on the market in accordance with Regulation (EC) 1107/2009;

- Plant Protection Products on site should not be expired;
- Storage areas, such as cabinets, should be so designed so as to contain any possible spillages.
- pesticides storage rooms should have a hard impermeable floor so in the event of spillage the pesticide is not leaked into the ground.

Unless otherwise stated on the label of the plant protection products, the following distances are recommended when storing plant protection products:

- Less than 20 meters away from water courses.
- Less than 30 meters from streams, boreholes or well
- Less than 100 meters from boreholes used for the provision of water to the public.
- Less than 30 meters away from the coast and bathing waters.

Extra attention should be given when PPPs are stored in the vicinity of open boreholes thus resulting in a greater risk of contamination.

Protection of human health

Fields in the Maltese Island tend to be in close proximity to civil areas or areas with high human activities including those of vulnerable groups which include but are not limited to The use of pesticides should be minimised or prohibited in certain specific areas. Pesticides should be applied during periods of low human activity, as deemed most appropriate. Appropriate risk management measures are to be taken and the use of low-risk plant protection products, and biological control measures should be considered in the first place.

Mitigation measures for areas used by the general public or by vulnerable groups such as public parks and gardens, sports and recreation grounds, school grounds and children's playgrounds and in the close vicinity of healthcare facilities will include, but are not exhaustive:



- the use of non-chemical means including cultural and mechanical methods at all times to prevent pests and diseases and consequently reduce use of pesticides.
- the prohibition of herbicides from such areas except in very urgent cases where there are no other alternatives.
- the prohibition of use of pesticides formulations classified as toxic, very toxic, carcinogenic, mutagenic or toxic for reproduction.
- the placing of clearly visible signage at times when pesticides are being applied and up till a minimum of two hours after pesticides are applied or until no residues are present on the vegetation, which ever is the longer period.
- the application of pesticides will be applied during times with low human activity, such as during weekdays at very early hours of the day in case of



parks and grounds, and in case of schools and educational institutions during times when students are not in the premises.

- pesticide users in the close proximity to areas used by the general public or by vulnerable groups will inform concerned persons beforehand in the most appropriate and effective manner.
- pesticides which liberate gases or volatile substances should not be used in civil areas or in close proximity to areas used by vulnerable groups.

Disposal

Disposal of Plant Protection Products, their containers and any contaminated item such as disposable personal protection equipment should be disposed of in sites which are appropriate for dangerous chemicals. There are 6 operational Civic Amenity Sites which are situated at Mriehel, Hal Far, Luqa, Maghtab, Tal-Kus, Xewkija Gozo and a new site recently opened in Ta' Qali.

Civic Amenity sites are open from Monday to Sunday (including Public Holidays) between 7.30am and 5.30pm. Entrance is free of charge and vehicles may be driven directly into the facility avoiding the need for parking. No appointment is required.

In addition to the above a site is available at the Research and Development Centre, Ghammieri in Malta and at the Government Farm in Xewkija, Gozo

Record Keeping

Professional users of plant protection products will be obliged to, for at least 3 years, keep records of the plant protection products they use. These records will include the:

- name of the plant protection product,
- time and the dose of application,
- area and the crop where the plant protection product was used.



The relevant information contained in these records will be made available to MCCA upon request.

A template for recording keeping of purchased pesticides is available in Annex II while a template for record keeping of applied pesticide is available in Annex III to this document.

Check List

1. Prevention and Suppression of Harmful organisms			
Crop rotation	<input type="checkbox"/>	Stale Seedbed Technique	<input type="checkbox"/>
Sowing Dates	<input type="checkbox"/>	Densities	<input type="checkbox"/>
Resistant / Tolerant Cultivars	<input type="checkbox"/>	Standard / Certified Seeds	<input type="checkbox"/>
Balanced fertilization/irrigation	<input type="checkbox"/>	Hygiene	<input type="checkbox"/>
Green Manure	<input type="checkbox"/>	Other	<input type="checkbox"/>

2. Monitoring			
Monitoring Crops	<input type="checkbox"/>	Weather Forecast	<input type="checkbox"/>
Monitor Pests	<input type="checkbox"/>	Identify Pests	<input type="checkbox"/>

3. Non – chemical measures			
Mulching	<input type="checkbox"/>	Manual / Mechanical Deweeding	<input type="checkbox"/>
Nets	<input type="checkbox"/>	Other	<input type="checkbox"/>

4. Protection of Bees			
Use of pesticides not toxic to bees	<input type="checkbox"/>	Use of granular / EC PPPs	<input type="checkbox"/>
Application during low bee activity	<input type="checkbox"/>	Drift reducing equipment	<input type="checkbox"/>
Application in the absence of strong wind	<input type="checkbox"/>	Application in absence of flowers	<input type="checkbox"/>
Notification to bee keeper	<input type="checkbox"/>	Other	<input type="checkbox"/>

5. Protection of Water			
Buffer zones during application	<input type="checkbox"/>	Adequate storage	<input type="checkbox"/>
Buffer zones for storage	<input type="checkbox"/>	Other	<input type="checkbox"/>

6. Protection of Human Health			
Use of non chemical means	<input type="checkbox"/>	No application of herbicides	<input type="checkbox"/>
No use of dangerous products	<input type="checkbox"/>	Placing of Signage	<input type="checkbox"/>
Application during low human activity	<input type="checkbox"/>	Inform persons concerned	<input type="checkbox"/>
No use of pesticides which liberate gas /	<input type="checkbox"/>	Other	<input type="checkbox"/>

7. Record Keeping			
Regular record keeping	<input type="checkbox"/>	Other	<input type="checkbox"/>

Annex I

WARNING

PESTICIDES APPLIED



NAME: _____ **PHONE:** _____

Remove sign after 24 hours or per label requirements.

Annex II

Annex III

