



IOBC-WPRS IP Guidelines

These guidelines are meant as inspiration for advanced Integrated Production (IP). Any organization that wants to design and operate an Integrated Production scheme can follow these guidelines. Guidelines drafted by national or regional organisations are referred to in the text as National or Regional IP guidelines.

This guideline consists of parts from the [IP General Technical Guidelines on Annual and Perennial Crops](#) and the [Crop Specific Technical Guidelines for Integrated Production](#) (text marked in green).

Two levels are distinguished:

- **Strict rules** are the minimum requirements that, according to the IOBC-WPRS, have to be met to ensure that the potential of the IP approach can be realized.
- **Recommendations** are preferred options for a higher level of IP application constituting extra care for the IP objectives. These approaches may increase the cost of production or the effort required.

Crop specific technical guidelines for integrated production of



Olives

4th edition, 2018

Edited by: Carlo Malavolta and Dionyssios Perdakis

With the support of the IOBC-WPRS Working Groups, specifically the [Working Group on "Integrated Protection of Olive Crops"](#).

[Back](#)

	Strict Rules	Recommendations
1. General Aspects	<i>In Integrated production good agricultural practices must be applied, products must be traceable to the producer and self-evaluation practice</i>	
1.1 Good Agricultural Practice (GAP), food safety management procedures and Integrated Production Standard	<p>The IOBC General and crop specific Guidelines do not and cannot mention all published "must" rules of Good Agricultural Practice, but will present selected requirements that seem to be of special relevance to the IP concept.</p> <p>Any organisation that produces according to a certified IP standard will also have to comply with any national or international GAP/food safety standard as pertinent for their situation and markets.</p>	
1.2 Traceability aspects out of general aspects	<p>All participants of the food production chain are responsible for the quality of the final product and, if appropriate, for the quantification of (pollutant) residue levels.</p> <p>All farm products that are IP certified must be traceable to the registered farm and field where it has been grown.</p>	
1.3 Self evaluation	<p>Each farm participating in a certified IP production scheme has to complete once per year the inspection protocol (= check-list) of the specific IP scheme (as made available by the organisation that implements the IP guidelines).</p>	<p>IP guidelines should specify self-evaluation protocols and encourage their use. The result of this self-evaluation should be available at the farm inspection by the control-certifying organisation, and an appropriate correction plan implemented.</p> <p>IP guidelines should include annual training of farmers on specific IP aspects.</p>

	Strict Rules	Recommendations
2. Biodiversity and landscape	<i>Biodiversity is one of the major natural resources of the farm to minimise pesticide input. IP guidelines therefore must specify a strategy to actively optimise the biological diversity at all 3 levels (genetic, species, ecosystem).</i>	
2.1 Ecological infrastructure (ecological compensation areas)	<p>The (non-cropped) ecological farm infrastructures must cover at least 5 % of the total farm surface (excluding forest).</p> <p>Existing ecological infrastructure on the farm must be preserved.</p>	<p>The surface of ecological infrastructure with low production intensity and without pesticide/fertilizer input should increase to 10%.</p> <p>Development of a professionally formulated conservation</p>

	<p>Flowering field margins must be established as reservoirs of pest antagonists.</p> <p>Areas of linear elements (e.g. flowering border strips, hedges, ditches, stone walls), and non-linear elements (e.g. groups of trees, ponds etc.), being present or to be planned on the farm should be connected and combined in such a manner that spatial and temporal continuity is obtained. This continuity is a prerequisite for the enhancement of fauna diversity and for the maintenance of a diverse landscape.</p> <p><i>Note: The 5% rule does not apply to individual farm in areas with predominantly small farms, with highly scattered properties In such cases the alternative way to comply with the requirement is to designate a surface of 5% or more of a comparable and homogeneous agro-climatic unit (e.g. same municipal district), set aside as ecological infrastructure by official and well documented regional programs. In this case, it has to be shown that the ecological infrastructure areas are well distributed in time and space in the municipal area, thus providing a guaranteed continuity.</i></p> <p>When an olive grove is located adjacent to forests or area covered by typical plants of Mediterranean bush this is sufficient to cover the 5% rule. Otherwise, the surface of ecological infrastructure should be minimum 5%.</p>	<p>assessment and plan for the farm and its implementation are recommended.</p> <p>Special attention should be given to enhance the functional biodiversity in and around fields:</p> <ul style="list-style-type: none"> • Avoiding risks of increasing host pests. • Enhancing the functional biodiversity is possible after conducting specific studies focusing on the target organisms whose populations we wish to increase. IP guidelines should recommend appropriate species. • It is recommended to increase biodiversity within orchards providing ecosystem services such as pest regulation or improved nutrient uptake efficiency or weed seed predation. o e.g. by practicing an alternating mowing regime with a permanent supply of flowering plants as food sources for the orchard fauna). • Plants species that form the vegetation cover in the alleyways should be naturally occurring or be selected/planted due to its favourable characteristics. • Contamination by spray drift from neighbouring crops can be detrimental to beneficial and other fauna. It is advisable to protect the orchard by planting windbreaks as barriers. <p>It is recommended to enhance functional biodiversity within the orchard (e.g. by practicing an alternating mowing regime with a permanent supply of flowering plants as food sources for the olive grove beneficial fauna). Plants species that form the vegetation cover should be naturally occurring or be selected/planted due to its favorable characteristics avoiding risks of increasing host plants of pests or pathogens (especially for <i>X. fastidiosa</i>).</p> <p>IP guidelines should recommend appropriate plant species.</p> <p>The surface of ecological infrastructure should increase to 10%.</p>
2.2 List of options	<p>IP guidelines must provide a list of at least 5 ecological options for the active enhancement of biological diversity.</p> <p>At least 2 appropriate options have to be selected as "must" by the individual farmer. Examples of lists of options are given in the IOBC-WPRS Tool Box.</p> <p>Specific examples for olives are:</p> <ul style="list-style-type: none"> (i) Border areas and/or slopes of terraced plots rich in plant species, (ii) Stone walls, (iii) Provision of wildlife habitats. 	
2.3 Field size		<p>The lateral dimension of an individual field should be considered as an important element in functional biodiversity, to provide ecological reservoirs and to secure connectivity with adjacent ecological infrastructures (see IOBC-WPRS Tool Box).</p>
2.4 Buffer zones	<p>Buffer zones between crop areas and sensitive off-crop areas, (such as surface waters, springs, important ecological infrastructures, heavily travelled roads, infested crops, hibernation areas of pests and diseases), must respect legal regulations. If no official regulation exists, buffer zones must be at least 3 m wide.</p>	<p>Buffer zones should preferably be wider than 3 meters.</p>

	Strict Rules	Recommendations
3. Site selection	<i>Suitability of the site has to be assessed and taken into account.</i>	
3.1 Site selection	<p>Only fields suitable for sustainable production of a particular crop can be used for IP production.</p> <p>If new sites are being brought into cultivation a proper assessment must be done on the suitability of the site for IP production considering prior use of land, type of soil, erosion potential, soil health status, and prior use of persistent herbicides, quality and level of ground water, availability of sustainable water sources, and impact on and of the adjacent area. Non suitable sites must not be used for production.</p> <p>For new olive-groves: site, cultivar, planting systems must be selected and harmonised so that regular yields of quality olives</p>	<p>For new agricultural sites a plan needs to be developed, describing and scheduling the measures to minimise all identified (and controllable) risks for environment and crops.</p> <p>Soil with an average content of clay and lime or slightly sandy should be preferred; the same for soil with pH ranging between 6.8 and 7.5.</p> <p>In areas with erosion risks the olive tree row plantations should be alternated with un-cropped field (in established plantations see Chapter 5).</p> <p>Thorough elimination of sources of disease inoculum especially</p>

and hence economic success, can be expected with a minimum use of agrochemicals and environmentally hazardous practices.

Exposition S and SW are generally recommended in colder areas. New plantations are not permitted in areas with slopes > 25% with exception for terraces or similar systems.

Sites with a favorable aspect and appropriate soils must be selected, avoiding the situations in which a continuous supply of inputs will be necessary. For instance, frost pockets (areas with high risk for frost and poor drainage situations) must be avoided as well as salty soils.

of *Verticillium dahliae* is needed. The absence of this fungus should be checked; the plantation should be avoided in case of previous crops being host plants of *Verticillium*.

	Strict Rules	Recommendations
4. Crop rotation / Sequence	<i>Crop rotation/sequence is a major method to improve soil quality and to prevent pests, diseases and weeds.</i>	
4.1 Annual crops: Frequency and sequence	Not applicable.	Not applicable.
4.2 Perennial crops: Crop sequence and inter/cover crops	<p>When re-planting a perennial crop:</p> <ul style="list-style-type: none"> To avoid pathogen transmission and a less vital crop development in the first years after plantation replanting of same crop is only to be admitted in IP guidelines on a case by case analysis. Also agronomic characteristics and period of plantation should be chosen to reduce these risks. Cover and catch crops have to be considered integrally in the design of the orchards. <p>Intercropping with host plants of serious diseases (e.g. solanaceous plants and cotton) must be avoided.</p>	The use of leguminous crops (Leguminosae/Fabaceae) as cover crops to improve soil structure, weed control and soil fertility is recommended; Leguminous crops fix N from the air and can contribute thus to the N supply.
4.3 (Inter) cover crops	<p>Cover crops contribute to maintenance of soil physical property (erosion and compaction) (5.1) and soil fertility (7), enhancement of biodiversity (see 2), control of pest and diseases (see 9.1) and prevention of leaching of N.</p> <p>In perennial crops, cover crops must be used in the alleyways.</p> <p>Cover crops in the alleyways must be used to contribute to maintenance of soil physical properties (5.1), soil fertility (7) and to enhance biodiversity (see 2). They also can contribute to preventive and curative crop protection, see 9.</p>	
4.4 Any further sub-chapter, e.g. for protected crops		

	Strict Rules	Recommendations
5. Sustainable soil management	<p><i>Sustainable soil management aims at preserving and optimising soil quality (chemical, physical and biological) in order to sustain quality production on the long term.</i></p> <p><i>Sustainable soil management is an interplay between key farming methods such as crop rotation, fertilisation and soil tillage:</i></p> <ul style="list-style-type: none"> For crop rotation see 4.1 and 4.2 for respectively annual and perennial crops, see also 4.3/5.2 for cover crops For soil fertility/nutrient management: see 7. For soil tillage see 5.1 and for organic matter management 5.3 	
5.1 Soil tillage and compaction	<p>Soil tillage methods and farm machinery use (type, intensity and traffic control: here called field traffic) are key factors to reduce erosion risk and sustain and improve soil fertility. Controlled traffic helps to improve aeration and water infiltration) appropriate soil tillage improves bio-physical soil properties, (e.g. aggregate size and stability) arranging for the least possible soil disturbance (to avoid compaction and erosion). Sound crop residue management helps to improve soil properties and fertility as well as increase water holding capacity</p> <p>Soil tillage methods and farm machinery for the management of soil must be used that are appropriate for soil type, cropping, topography, erosion risk and climate in order to sustain and improve soil fertility.</p> <p>To avoid disturbance of soil stratification, creation of hard layers (pans) and erosion, classic frequent tillage management has to be replaced by minimum and superficial tillage (10-15cm) with</p>	<p>Minimum soil tillage or non- inversion tillage is recommended. However, if soil borne damaging organisms (weeds, pests, diseases) increase to a level that endangers crop production at all, occasional ploughing is appropriate.</p> <p>Timing of tillage can be used to optimise nitrogen management.</p> <p>Farm machinery and soil management should be chosen in order to minimise disturbance of soil stratification, to reduce soil compaction, to preserve organic matter, to improve the efficiency and effectiveness of mechanical weed control and agrochemical applications, and to reduce fuel consumption.</p> <p>GPS guided traffic (controlled traffic) is recommended where appropriate. It contributes to minimising the area that machinery drives on, thus reducing overall soil degradation.</p> <p>The use of inversion tillage can be applied only if strictly necessary</p>

	<p>arrows or tiller applied only if necessary. This tillage could be integrated with the use of systemic low persistence herbicides.</p>	<p>In general, the mowing weeds should substitute or reduce soil tillage.</p> <p>Timing of tillage can be used to optimize nitrogen management.</p>
5.2 Soil protectiona	<p>Soils need to be protected for degradation and erosion by appropriate soil tillage and soil cover strategies maintaining the longest possible soil protection by crop or non-crop cover, without detriment to yield with minimum inputs of fertilisers and irrigation water. Soil protection should be sustainable under the local conditions and optimised locally.</p> <p>In regions with leaching and erosion risks, an appropriate soil cover, (with adequate N-uptake capacity), must be maintained.</p> <p>Where erosion damages are visible, a plan needs to be developed and implemented, describing and scheduling the measures to minimise erosion risks.</p> <p>For perennial crops: use of cover crops is required, see 4.2.</p> <p>Soils need to be protected for degradation and erosion by appropriate soil tillage and soil cover strategies maintaining the longest possible soil protection by crop or non-crop cover. Soil protection should be sustainable under the local conditions and optimised locally.</p> <p>Alleyways must contain cover plants to avoid soil erosion and compaction without detriment to yield and quality, to maintain and enhance plant species diversity in the olive grove to increase ecological stability, and to minimize the use of herbicides.</p> <p>Bare soil management is permitted in spring and summer to avoid competition for water and nutrients.</p> <p>Overall bare soil management of olive groves throughout the year is not permitted with an exception for arid areas where this green cover could create water deficiencies and the risk of fires is high.</p> <p>Regional or national guidelines must specify a maximum width for the weed free strip and/or percentage of the soil surface which may be weed-free. The procedures for practical implementation must be defined in the regional guidelines according to climate, soil type, slope, cultivars, age of the trees and precipitation levels.</p> <p>Herbicides can only be used locally during spring and summer in places where the use of machinery (preferred option) is difficult.</p>	<p>Measures to avoid or to control soil erosion should be defined for each crop based on the erosion potential specific to the region and farm.</p> <p>In very sloping areas, soil protection can also be achieved with contour cultivation and/or terraces.</p> <p>Low intensity cultivation is preferred. Non inversion tillage can contribute to reduction of erosion.</p> <p>In areas with sufficient precipitation (e.g. >500 mm during the growth season) and suitable soil type the maintenance of a permanent or temporary green cover during the growth season is highly recommended to avoid soil compaction, promote water infiltration and increase biodiversity.</p> <p>It is recommended that in case of necessary control of weeds, herbicides should be replaced by mechanical cultivation, or by using a mulch soil cover with organic materials or by partial or total green cover. Mulch type and sanitary quality should be carefully selected since it could favour certain pest (voles).</p> <p>It is recommended that use of selective broad-leaf weed herbicides in the alleyways is avoided.</p> <p>The use of <i>Leguminosae</i> as cover crops to improve soil structure, weed control and soil fertility is recommended.</p> <p>Alleyways should be of grass and/or herbs and of adequate width to easily accommodate the tractor wheels.</p> <p>A green cover during winter is strongly advised at least in the alleyways, with an exception for arid areas.</p> <p>Tillage should be avoided in fields with a high slope.</p>
5.3 Organic matter	<p>IP guidelines must specify a target range for optimal organic matter content.</p> <p>An organic matter balance must be calculated to determine the surplus or shortage of supply in reference to the defined optimal range</p> <p>Management must be targeted towards maintaining or reaching the targeted level of organic matter content for the specific soil type and location by appropriate measures (fertiliser choice, crop choice, cover crops and green manure etc.).</p>	<p>The use of bio-indicators, (earthworms, cellulose decomposing organisms, predatory mites etc.), for monitoring the diversity of fauna and flora is to be encouraged.</p> <p>The pruning material can be mechanically destroyed to increase the organic and mineral content of the soil, avoiding this in case of pathogen transmission.</p>
5.4 Soil disinfection	<p>Chemical fumigation/disinfection is not allowed.</p>	<p>Solarisation is strongly recommended where effective.</p> <p>See 4.2.</p>

	Strict Rules	Recommendations
--	--------------	-----------------

6. Cultivars, rootstocks / cultivation systems	<p><i>Healthy and vital seeds, rootstock and/or plant material is important for a healthy and resilient crop. Using resistant and tolerant cultivars and varieties for the major pests and diseases is an essential element of the IP approach.</i></p>	
6.1 Choice of cultivars	<p>Cultivars and rootstock must be adapted to local conditions.</p> <p>IP guidelines must supply the growers with a list of suitable cultivars. The list should be based also on existing official national lists of varieties.</p> <p>IP guidelines must specify the relevant traits of the cultivar that have to be taken into account when choosing a cultivar, such as disease and pest tolerance and resistance.</p> <p>The cultivar chosen must offer good prospects for economic success with minimal use of agrochemicals.</p> <p>IP guidelines must provide a list of the relative susceptibilities of</p>	<p>Disease resistant or tolerant varieties should be chosen if they are available and commercially acceptable. Appropriate cultivars can support IP approaches by reducing off farm agro chemical inputs such as fertilizers and pesticides. For instance through adequate resistance or tolerance to major diseases and pests.</p> <p>Alternation of cultivars (e.g. ripening period for flies) capable to disrupt pest cycle are recommended, where appropriate.</p> <p>Cultivars resistant or tolerant to pests, fungal diseases, bacteria, phytoplasms, physiological disorders and adverse climatic conditions (i.e. frost) are preferred.</p> <p>The use of well adapted cultivars to local conditions is preferred.</p>

	the commonly grown cultivars to all important pests and diseases.	
6.2 Seed and plant quality and health status	<p>Annual crops:</p> <p>All seed and planting material for annual and herbaceous perennial crops that is purchased must be certified and accompanied by a plant health certificate.</p> <p>Perennial crops:</p> <p>If available, planting material for perennial crops must be sound and certified as virus tested, vector and disease free. Where this is not available, planting material of the highest health status available must be used.</p> <p>If available, planting material should be sound and certified as pathogen and pest-free, including the substrates of growing media. Where this is not available, planting material of the highest health status available must be used.</p>	<p>Annual crops:</p> <p>Alternation and mixtures of cultivars are recommended, where appropriate.</p> <p>Seed and Planting material should be of the highest possible level of health status (virus/disease free).</p> <p>Perennial crops:</p> <p>All propagation material should be inspected by the grower to be free of pests and diseases. Infested material must not be used.</p> <p>It is strongly recommended that plant health quality control systems are implemented for private or inhouse (on farm) nursery propagation.</p>
6.3 Cultivation/fruit management, planting and training system	<p>The cultivation system, including planting pattern, training and pruning, has to respect the optimum physiological status of the crop plant.</p> <p>New plantations should adopt locally adapted cultivation systems that allow integrated plant protection principles and measures to enhance biodiversity to be integrated optimally.</p> <p>Densities of plants should take into account the annual precipitation and the local experience.</p> <p>High plant density hedgerow systems (e.g. > 300 plants/ha) are permitted only if i.e. do not depend on high agrochemical inputs practices (e.g. total surface application of herbicides).</p> <p>For the choice of training systems IP guidelines must recommend those facilitating the following objectives:</p> <ul style="list-style-type: none"> • production of high quality olives, • olive tree longevity, • biological diversity (botanical, zoological), • reduction of conditions favourable for the development of insect pests and diseases, • a more efficient application of pesticides and fertilizers, • a reduction of the amount of pesticides applied, • mechanical harvesting. <p>Olive trees must be regularly trained and pruned to achieve a balance between growth and regular yields and to allow good penetration of light and sprays.</p> <p>Proper ventilation of the canopy is an important prophylactic measure against diseases especially <i>Fusicladium oleagineum</i>, <i>Colletotrichum</i> spp. and scale insects.</p> <p>Severe pruning should be avoided except in cases of canopy renewal i.e. after frost damage, disease damages or heavy infestation by scale insects.</p> <p>The frequent disinfecting of pruning equipment is necessary to avoid the spread of disease infections (e.g. <i>Pseudomonas</i> spp.).</p> <p>The use of growth regulators is not permitted, except for thinning of table olives or to help mechanical harvesting. IP guidelines must set out which chemicals are permitted, clearly specifying the aim and the restrictions of their use.</p>	<p>Contamination by spray drift from adjacent crops can be detrimental to beneficial and other fauna. It is advisable to protect the orchard by planting windbreaks as barriers.</p> <p>After pruning cicatrization of large cuts should be cured by mastics in order to avoid wood diseases or wood boring insects (e.g. <i>Euzophera</i> sp.).</p> <p>Mechanical destruction of healthy pruning materials is recommended as alternative to burning to increase organic matter in the soil.</p> <p>Pruning and harvest should be avoided in rainy days.</p>

—	Strict Rules	Recommendations
7. Plant nutrition	<i>Fertilisation should consider all aspect linked to soil management (see §5) and should be adapted to plant needs (types, dosages and timing) considering the farm context.</i>	
7.1 Nutrient management strategy macro nutrients P, K	<p>IP guidelines must specify agronomically desirable and environmentally acceptable target ranges for soil fertility for at least P and K.</p> <p>A nutrient allocation plan for P and K for each crop on a plot/field level must be established, taking into consideration:</p> <ul style="list-style-type: none"> • The actual field status of soil fertility in relation to agronomically desirable and environmentally acceptable levels (P, K evt Mg). • The balance approach: Off-farm fertilizer input must only compensate the real exportation and unavoidable 	

	<p>technical losses resulting:</p> <ul style="list-style-type: none"> • for annual crops in an balance of inputs and exports at a rotational level (including the technical unavoidable losses), • for perennial crops in an annual balance of inputs and exports. <ul style="list-style-type: none"> • Additional inputs can be justified to maintain the desired soil fertility level. Inputs exceeding this plan are unacceptable: for instance small quantities of phosphate are sufficient to cause over-enrichment of surface waters. Phosphate from agricultural land is mostly translocated by erosion of small soil particles. • The distribution of macro nutrients over the years might be different to the export with crops, as long as the rotational balances are maintained. 	
<p>7.2 Assessing P, K and other nutrient requirements</p>	<p>Organic matter and nutrient analysis (minimal for P and K) of the soil is the basis for assessing nutrient requirement (except N): see 6.1.</p> <p>Soil analyses for the major elements, P, K, Mg, must be carried out at defined intervals (i.e. 3-10 years, depending on the crop).</p> <p>IP guidelines must specify the analysis techniques and desired ranges of soil fertility. See also 6.1.</p> <p>Uptake and demand criteria for major nutrients are an additional source for fertilization plans, however the soil balance approach on a rotational level must be maintained.</p>	<p>Foliar analysis can be applied as complementary test method.</p>
<p>7.3 Nitrogen supply and timing</p>	<p>N supply and timing must be matched with the crop demand. The use of nitrogen needs particular care because nitrogen leaching and evaporation have significant environmental consequences.</p> <p>A N fertilization plan must be established that specifies for every crop and plot the N sources and available amounts and shows how the crop demand is met. Taking into account:</p> <p>Hidden nutrient sources such as importation through polluted air (N).</p> <p>The soil mineral N status before cropping season.</p> <p>Mineral N and N mineralisation from organic sources.</p> <p>IP guidelines have to define for each crop the maximum nitrogen input, (expressed in kg N/ha/year or crop rotation component), and specify eventually the time-window of adequate N application.</p> <p>The chemical content of at least NPK in all inorganic and organic fertilizers must be known and documented.</p> <p>Where possible and appropriate N fertilization systems must be used that enable split applications based on N status of soils and or plants.</p> <p>The maximum permitted nitrogen input (expressed in kg N/ha/year and per ton of olives harvested per ha) and period of application (e.g. when soil is saturated by rainfall) must be defined in the guidelines.</p> <p>It is recommended that in established olive-groves the maximum amount of nitrogen is set at 15kg N (per ha and year) per ton of olives harvested. In any case, the expected production has to be taken into account especially in case of alternating production.</p> <p>Nitrogen supply must remain an alternative and not the base of the fertilization and the use must be justified.</p>	<p>N - requirements should be covered by Leguminosae, (biological N-fixation), to the largest possible extent while preventing any danger of leaching and taking into account possible effect on augmenting soil borne damaging organisms.</p> <p>The total amount of available nitrogen in organic fertilisers should be accounted for a period of 3 years.</p> <p>The use of slow release fertilizers can contribute to minimize nutrient losses and increasing nutrient availability during the period that they are most needed.</p> <p>The use of slow release fertilizers can contribute to minimize nutrient losses and increasing nutrient availability during the period that they are most needed by the trees.</p> <p>Fertigation is recommended where feasible.</p> <p>The use of leguminous cover crops during winter may reduce the total N requirements when properly managed.</p> <p>The application of nutrients in variable-dosages based on vigour maps or soil or plant samples is recommended.</p> <p>IP growers should be encouraged to reduce the amount of nitrogen whenever possible to minimize leaching. Leaf analysis and observation of the green coloration of the leaves is recommended. A dark green color of the leaves suggests in most cases that the nitrogen fertilization can be reduced.</p> <p>The total amount of available nitrogen in organic fertilisers should be accounted for a period of 3 years.</p>
<p>7.4 Supply of other major or micro nutrients</p>	<p>Inputs have to be justified on the basis of a fertilization plan. See 6.1 nutrient allocation plan.</p> <p>The chemical content of at least NPK in all inorganic and organic fertilizers must be known and documented.</p> <p>Where foliar symptoms or plant analysis indicate a deficiency of micronutrients the application of these elements is justified. These elements should be in general administered via the root system. Foliar fertilization is only permitted when soil application is not possible or when the soil characteristics limit the efficiency of soil application.</p>	<p>The replacement of mineral P-input through enhancement of the activity of soil organisms (e.g. mycorrhiza) should be encouraged.</p>
<p>7.5 Organic manures</p>	<p>Organic manures or compost can help to improve soil fertility by increasing organic matter content, improving nutrient and water retention, and reducing erosion.</p> <p>Organic manures must contain only the lowest possible level of</p>	<p>The use of organic fertilisers, including high quality compost, should be promoted.</p> <p>More severe limitations for heavy metal and other toxicants exceeding minimum level requirements are to be encouraged</p>

	<p>Organic manures must contain only the lowest possible load of heavy metals and other toxicants and meet the legal regulations.</p> <p>Any use of treated human sewage sludge on land destined for agricultural use must be in accordance with updated versions and internationally applied "Codes of Practice for the agricultural use of Sewage Sludge". Existing "Codes of Practice for the Control of Microbial Hazards" give further guidance. Untreated human sewage sludge must not be applied to farmland.</p>	<p>exceeding minimum legal requirements are to be encouraged.</p> <p>Apply olive mill wastewater for olives fertilization according to national legislation.</p>
7.6 Safe and efficient application of fertilisers and manures	<p>Application machinery must be kept in good condition. Regular servicing and annually verifying calibration, (quantity per time and per area), must be carried out by the qualified farmer or a specialised company.</p> <p>IP guidelines must contain lists of measures to reduce technically unavoidable nutrient losses by leaching, erosion and evaporation, (e.g. ground cover or timing of soil cultivation).</p> <p>Manures and fertilizers must not be applied to logged water, frozen soil, or steep ground where there is a risk of run-off.</p>	<p>Slurry should not be applied within 10 m of a watercourse or 50 m from a well, spring or borehole that supplies water for human consumption or for use in farm dairies.</p> <p>Injection or low emission methods of application of manures and slurry should be applied to reduce ammonia and GHG emissions.</p>
7.7 Storage of fertilisers	<p>Storage conditions and safety precautions for fertilizers must fulfil the basic requirements of Good Agricultural Practice (GAP).</p> <p>Solid fertilisers, manures and plant nutrients must be stored in a clean, dry location where there is no risk of water contamination.</p> <p>Inorganic and organic fertilisers must not be stored with fresh produce and plant propagation material.</p>	

	Strict Rules	Recommendations
8. Irrigation	<p><i>Irrigation has to be based on crop requirement and the irrigation method has to be adapted to the crop and farming context.</i></p> <p><i>Irrigation must be applied according to need and with the best methods to avoid losses (e.g. micro-irrigation). Excessive soil moisture may result in leaching of nutrients, competition with weeds, and risks of pest and disease (outbreaks). Excessive use of irrigation water is wasteful.</i></p>	
8.1 Water requirement of the crops	<p>All measures must be taken to minimise water loss and to optimise product quality. Irrigation is only justified if the available water does not satisfy the crop's requirements taking into account also soil types, climatic conditions and the relation between the amount applied and quality/quantity of the crop. The calculated water amount must not exceed field capacity (water holding capacity) also to avoid nitrate leaching.</p> <p>Water must be supplied according to the soil moisture deficit and the water storing capacity of the soil.</p> <p>Regional guidelines have to define the maximum water volume not to be exceeded.</p>	<p>Irrigation scheduling systems should be used where available. Advanced systems like deficit irrigation should be used. Systems used should:</p> <ul style="list-style-type: none"> Utilise, whenever possible, local data on reference evaporation rates calculated by means of local meteorological stations. The amount of applied water should be recorded in the farm records. <p>In olive-groves where irrigation is applied, the water supply should cover the water requirements of the plant during critical stages, i.e. fruit set and oil accumulation stage.</p> <p>The evaluation of water requirement should be based on evapotranspiration; deficit irrigation method (water supply is reduced below levels defined by evapotranspiration and mild stress is allowed) is also advised to maximize yield and quality.</p>
8.2 Irrigation methods	<p>A water management plan must be available at the farm that specifies water sources, the decision support tools, the irrigation methods, etc.</p> <p>The irrigation plan needs to be established individually for each plot. This will help to optimise water usage and reduce waste, e.g. irrigating at night, maintenance to reduce leakage, collection of rainwater from roofs, etc.</p>	<p>The most efficient and commercially practical water delivery system should always be used to ensure best utilisation of water resources.</p> <p>Whenever possible, a combination of irrigation with fertilisation (fertigation) should be considered.</p> <p>Take into account that irrigation might influence the nutrient dynamics.</p> <p>The use of drip irrigation is preferred.</p>
8.3 Water quality and supply	<p>Irrigation water has to be shown to be of adequate quality (conductivity, Cl-content, salinity and content of polluting agents), not exceeding the official tolerance levels, and pathogens relevant to the crop.</p> <p>The use of untreated sewage water for irrigation/fertigation is prohibited. Where treated sewage water is used, water quality must comply with the WHO-Guidelines on "Safe Use of Wastewater and Excreta in Agriculture and Aquaculture".</p>	<p>Irrigation water should be obtained from sustainable sources, (i.e. sources that supply enough water under normal conditions).</p> <p>The regular analysis of the water quality with respect to heavy metals, N, and Na/Cl content etc., is recommended.</p> <p>The installation of measuring devices in every plot for registering the amount of water applied is to be encouraged.</p>

—	Strict Rules	Recommendations
9. Integrated plant protection (IPM)	<p><i>The Principles of Integrated Plant Protection have to be applied. Preventive (indirect) measures and observations in the field on pest, disease and weed status must have been considered before intervention with direct plant protection measures takes place</i></p>	
9.1 Prevention (= indirect plant protection)	<p>The prevention and/or suppression of key pests, diseases and weeds can be achieved or supported among other options especially by the:</p> <ul style="list-style-type: none"> • Choice of appropriate resistant/tolerant cultivars. • Use of an optimal replanting interval or similar strategy <p>to prevent diseases and weakness.</p> <ul style="list-style-type: none"> • Use of adequate cultivation techniques, (e.g. green cover, pruning, removal of infected prunings, alternate mowing); pruning not only removes dead tissues but also allows proper ventilation and more effective spray coverage. • Use of balanced fertilisation (especially low nitrogen input) and irrigation practices. • Protection and enhancement of important natural enemies by adequate plant protection measures. • Utilisation of ecological infrastructures inside and outside production sites to enhance a supportive conservation biological control of key pests by antagonists. <p>IP guidelines must (see 8.1.3.c) describe a basic selection of preventive measures that have to be implemented.</p> <p>The prevention and/or suppression of key pests and diseases must be supported among other options especially by the:</p> <ul style="list-style-type: none"> • Plantation of resistant or less susceptible cultivars. • The protection and enhancement of beneficial organisms / key natural enemies (e.g. insect parasitoids or predators). • Use of appropriate cultivation techniques (e.g. balanced fertilization, green cover, pruning, removal of infected prunings, alternate mowing); pruning not only removes dead tissues but also allows proper ventilation and more effective spray coverage; • Use of optimum fertilization (especially low nitrogen input) and irrigation practices; • Ecological infrastructures inside and outside production sites to enhance a supportive conservation biological control of key pests by antagonists. • Avoid insecticide treatments as much as possible to prevent outbreaks of secondary pests. <p><i>Bactrocera oleae</i> (olive fruit fly)</p> <ul style="list-style-type: none"> • Cultivation practices that may reduce the damages of the major olive pest, <i>Bactrocera oleae</i> (olive fruit fly) should be followed i.e. harvesting at the earliest possible time, short harvest period and stripping all the olive fruits from the tree. Tillage after harvest, not before, to prevent negative effects on predation of <i>B. oleae</i> pupae. Infestation of <i>B. oleae</i> may be constrained in part by planting resistant cultivars. Avoid the interplanting of susceptible, large drupe varieties, with the more tolerant cultivars for oil production. Avoid the excess irrigation because the olive fly population is much favoured in irrigated olive groves. <p><i>Verticillium</i></p> <ul style="list-style-type: none"> • In case of previous crops being host plants of <i>Verticillium</i> consider the pathogen level in the soil and then proper cultivars should be selected or solarization to be applied. 	<p>The prevention and/or suppression of key pests and diseases should be supported among other options especially by:</p> <ul style="list-style-type: none"> • Hygiene, proper disinfection or cleaning of buildings, clothes, hands, tools, booms, tanks, sprayers and machines is recommended. • Preventing the carryover of organisms which transmit a phytohygenic damage potential, when spread. Examples: Weeds like <i>Cyperus esculentus</i> or <i>Rorippa palustris</i>, nematodes like <i>Globodera rostochiensis</i>, fungi like <i>Plasmodiophora brassicae</i> with machines. <p>The prevention and/or suppression of key pests and diseases should be supported among other options especially by:</p> <ul style="list-style-type: none"> • Choice of appropriate resistant/tolerant cultivars is recommended. • Use of methods to reduce the overwintering inoculum of the pathogens as a measure for delaying/reducing the disease epidemics in the next season is highly recommended. • Pruning, irrigation and elimination of other wood damaging factors may control pests such as scales and scolytids or diseases. • Take into account any adjacent abandoned olives groves that may act as sources of pests and diseases. <p><i>Anthracnose</i></p> <ul style="list-style-type: none"> • Removal of dead twigs and mummified fruits will reduce inoculum of <i>Anthracnose</i>. <p><i>Bactrocera oleae</i> (olive fruit fly)</p> <ul style="list-style-type: none"> • Plants favouring presence of parasitoids can be used to enrich the vegetation cover.
9.2 Risk assessment and monitoring	<p>Interventions to control pests, diseases and weeds must be based on adequate monitoring methods and tools to determine whether and when to apply direct control measures.</p> <p>Robust and scientifically sound warning, forecasting and early detection/diagnosis systems (decision support systems) as well as sound threshold values are essential components for decision making.</p> <p>The official forecasts of pest and/or disease risks, or officially established threshold levels defined for the region must be</p>	<p>Empirical threshold values should be replaced by more scientifically sound approaches, like DSS, and expert systems.</p> <p>Use of mathematical models and regionally adapted Decision Support Systems (DSS) to take decisions about whether, when and where it is necessary to apply pesticides is strongly recommended.</p> <p>When information from large-scale decision support tools (e.g., official warning systems, DSSs) is used, it is strongly recommended to adapt this information to local and farm</p>

taken into account before treatments.

A monitoring plan for pests and diseases should be established based on the local experience. Treatments should be based on pest presence/levels and damage thresholds (to be periodically revised) taking in consideration the weather forecast, especially the temperature trend. Strict compliance with the officially established measures to avoid the risk of *Xylella fastidiosa* entry in new regions has to be a priority in risk assessment and prevention.

***Bactrocera oleae* (olive fruit fly)**

- Monitoring of the olive fruit fly should start by traps established in late spring and baited with ammonium salts or protein hydrolysates, or using traps with food, sexual and/or visual attractants. The infestation level on the fruits should be recorded.

Closterotomus (Calocoris) trivialis

- Can locally cause damages when high numbers occur from early emergence of flower buds until the flowering period. Monitoring has to be implemented and when dense populations occur on the trees in the critical period, then sprayings can be applied.

conditions, by accounting for weather variability, pest distribution in the field, natural enemies, cultivar susceptibility, sanitary status of the orchard, previous pesticide sprays, etc.

9.3 Direct plant protection method

Where indirect plant protection measures are not sufficient to prevent a problem and forecasts and threshold values indicate a need to intervene with direct plant protection measures, priority must be given to:

- Those measures which have the minimum impact on human health, non-target organisms and the environment.
- Biological, biotechnical* and physical methods must be preferred above chemical methods if they provide satisfactory control.

*: *Biotechnical control methods are defined in applied entomology as highly specific procedures that influence the behavior or development of pests without direct biocidal activity, such as mating disruption, deterrents, sterile insect technique.*

Wherever a control measure is deemed necessary, a biological, physical or biotechnical control method must be used if available and effective e.g.

***Bactrocera oleae* (olive fruit fly)**

- Bait sprays: With this method, the quantity of sprayed insecticide is greatly reduced 'spot spaying' (in comparison to cover sprays as well as the damage to beneficial and other fauna. These sprays should start at the beginning of fruit kernel hardening, taking into account several other criteria such as trap catches (based on an effective monitoring system), temperature, wind speed and relative humidity data, the % of fertile females in the population and local experience. Effectiveness of the method depends also on careful and early monitoring to determine the hot spot areas in the region (i.e. favorable for olive fruit fly microclimate, trees with unharvested fruits, susceptible varieties, irrigated or abandoned farms that may act as sources of the pest).
- Lure & kill techniques: Food and sex attractant traps impregnated with insecticides McPhail or bottle types of traps baited with food attractant represent environmentally safer methods for olive fly control. A dense net of bait traps with or without sex pheromone (mass trapping) can be established in late spring or early summer before the commencement of fly oviposition, and further extended in September, if needed. After establishment, close monitoring with bait traps and fruit sampling should follow. Bait sprays should be applied in cases of high fly populations as indicated in McPhail captures or fruit infestations.
- Biological control: Natural enemies such as larval and pupal parasitoids or epigeal predators and fungi may be active but generally they do not suppress the pest below economically significant levels. Suitable cover crops may support the regulatory effect of natural enemies
- Cover sprays: Reliance on cover sprays would require frequent applications that may have a detrimental impact on the beneficial and other fauna and may contribute to the appearance of new infestations of secondary pests

Weed management should be achieved, as far as possible, by non-chemical methods.

Where important natural enemies are absent from olive-groves where the pest situation requires regular control measures (e.g. parasitoids of scale insects), key natural enemies (one of them usually the predator *Chrysoperla carnea*, the second one representing important insect parasitoids (especially against scales or the olive fly) or another predator like *Anthocoris* spp.) should be introduced, if available and effective.

***Bactrocera oleae* (olive fruit fly)**

- Localised bait sprayings based on monitoring systems and DSS are strongly advised for olive fly control.

Verticillium

- *Verticillium* wilt can be a serious disease in irrigated plantings and in olive crops intercropped with cotton, potato or other susceptible crops. It is essential to avoid planting on infected soil and use pathogen-free propagation material or use resistant/tolerant cultivars. Soil solarisation can contribute to the control of the disease.

Palpita (Margaronia) unionalis

- May be damaging in nurseries and young trees and can be controlled by the use *Bacillus thuringiensis*.

Zeuzera pyrina

- Causes mining of branches causing destruction of part or entire canopies. Monitoring with traps for timely control or mating disruption can control this pest. Also direct application of pesticides in mines can be effective when possible.

***Otiorhynchus* spp.**

- May cause strong damages to young leaves and shoots especially on young plants; synthetic fiber strips on the trunk can prevent adult damages to the canopy.

Fusicladium oleagineum

- Can defoliate canopies in humid and rainy areas; copper treatment in spring and autumn can control this disease.

Rhynchites cribripennis

- Cause feeding holes in young fruits that cause fruit drop. When high densities occur at the end of the flowering period then sprayings can be applied.

and development of resistance. Cover sprays can be applied based on economic thresholds depending on the variety and region, generally lower for table and higher for olive oil varieties. Cover sprays only to be applied in specific cases of high infestations.

Prays oleae (olive moth)

- Damage to young fruit can be serious in certain regions and varieties (depending also on plant/canopy management). Monitoring of the moth population by sex pheromone traps always combined with flower or fruit infestation monitoring is essential.
- Several natural enemies are active against this pest and should be protected. Sprayings against anthrophagous larvae are only applied in cases of low percentage of olive flowering and high population density of the pest. In these cases *Bacillus thuringiensis* can be used.
- Treatments with compatible selective insecticides should be applied to prevent the entry of hatched larvae in young fruit.

Saissetia oleae and other scales (*Parlatoria oleae*, *Aspidiotus nerii* etc.)

- Can be efficiently controlled by beneficial fauna.
- Cultural methods such as pruning and moderate use of nitrogen fertilizers are of major importance
- Monitoring is based on sampling to estimate the population density as well as the % of parasitism and the presence of honeydew or sooty mould.

In case of outbreaks selective insecticides have to be applied during the hatching period.

9.3.1 Restrictive use of pesticides

IP guidelines must (see 8.1.3.d) classify pesticides (to be used for the key pests, diseases and weeds) in three categories: 'permitted' (green list), 'permitted with restrictions' (yellow list) and 'not permitted' (red list) based upon±

- Their toxicity to man
- Their toxicity to key natural enemies
- Their toxicity to other non-target organisms
- Their pollution potential for the environment (soil, water, air)
- Their ability to stimulate pests and diseases
- Their selectivity
- Their persistence
- Their potential to develop resistance in target
- Incomplete or missing information
- The necessity of use.
Regularly updated data on the eco-toxicological profiles of pesticides are compiled by IOBC cf. toolbox).

All agrochemicals used must fulfil the basic requirements of GAP.

- The plant protection product applied must be officially approved for the target, as indicated on the product label, or for officially approved off-label uses.
- In countries that have no official registration schemes yet, reference is made to the FAO Code of Conduct on the Distribution and Use of Pesticides.
- All pesticide applications must comply with the statutory conditions regarding the specific crop, maximum permitted total dose, maximum number of treatments, spray intervals and pre-harvest interval, as indicated on the product label or authorised off-label uses.
- Since label doses are maximum doses approved by the registration authorities, reduced dosages are possible, (especially in herbicides).

Chemical soil disinfection is not allowed.

Based on the general criteria, the following categorization of certain pesticides and pesticide groups is established. It may require up-dating with the development of new products.

Not Permitted

- Toxic, water polluting or very persistent herbicides (e.g.

The use of reduced dosages is recommended wherever possible in accordance with national documentation, experience and legislation.

In Europe EPPO standards are also used as references.

Adoption of anti-resistance strategies for the at-risk pesticides is strongly recommended. We may discuss for resistance development prevention measures and to add to consult resistance records –databases of the area, where available.

Adequate knowledge of the physical mode of action PhMoA) of pesticides (i.e., preventative, curative, antisporeulant properties) and of rain fastness is recommended for pesticide choice and spray scheduling.

Levels of natural enemies' populations should be monitored and considered to select appropriate selective active ingredients.

- herbicide, water, potassium or very persistent herbicides (e.g. Diquat, Paraquat)*.

Permitted with Restrictions

The following categories of compounds don't fit in IPM schemes, however sometimes might be unavoidable. Therefore restrictions are required (yellow list principle):

- Broad-spectrum pesticides: precise indication and only for strictly limited number of applications,
- Dithiocarbamate fungicides due to their average high or middle toxicity towards the auxiliaries,
- Sulphur (dosage must be limited to non-toxic levels so that predatory Phytoseiid mites are not affected),
- Fungicides and insecticides with high potential to develop resistance (maximum number of applications to be clearly defined),
- Copper (guidelines have to define the maximum amount in kg per ha and year, taking into account both effects against diseases and against symbiotic bacteria for Olive fly)
- Post-emergence applications of herbicides are permitted in any case only after harvest,
- In case of soil preparation under the canopy for harvest, the use of residual herbicides with medium persistence is permitted, but their application has to be restricted in early autumn to avoid residues on the dropped olive fruits,
- The use of growth regulators is not permitted, except for thinning of table olives or to help mechanical harvesting,
- Persistent herbicides with DT90<1 vegetation period (spring-autumn): the situations of their exceptional use must be clearly specified (e.g. in the first three years after planting, maximum of one dose-equivalent per annum). and the risk of residues in olive oil be monitored.

*The list of "non-permitted" and "Permitted with restrictions" still contains group of active ingredients no longer allowed in Europe; if these groups are still allowed outside Europe than these rules must be followed:

9.3.2 Resistance management

Where the risk of resistance against a plant protection measure is known and where the level of pests, diseases or weeds requires repeated application of plant protection products in the crops, IP guidelines and IRAC / HRAC / FRAC** have to provide clear recommendations or mandatory requests for an anti-resistance strategy to maintain the effectiveness of the products.

**:

- *IRAC = Insecticide resistance action committee*
- *HRAC = Herbicide resistance action committee*
- *FRAC = fungicide resistance action committee*

9.4 Lists to be compiled as part of IP guidelines

IP guidelines must establish for each crop:

1. A restrictive list of key pests, diseases and weeds that are economically important and require regular control measures in the region / crop concerned.
2. A list of the most important known site-specific natural antagonist(s), with information on their importance in each crop. The protection and augmentation of at least 2 antagonists must be mentioned in advanced as a desirable objective sustainable production systems.
3. A list of preventive and highly selective direct control measures to be used in the IP program ("green list"). See explanations and examples in the [IOBC-WPRS Tool Box](#).
4. A list of pesticides to be used with restrictions ("yellow list"): A selected group of plant protection products that do not qualify for the "green list" but should be available to the grower despite certain negative aspects, (especially for reasons of resistance management or earmarked for exceptionally difficult cases). These listed products are permitted only for precisely identified uses with clearly defined restrictions.

On the list of the most important known antagonist(s) of the key pests ("Passport") at least two key groups or species of natural enemies must be identified (i.e. coccinellids, chrysopids, anthocorids, hymenoptera parasitoids or phytoseiids, ground-

	<p>dwelling arthropods) and their protection from non-selective insecticides, acaricides or fungicides be declared important.</p> <p>Where important natural enemies are absent from olive-groves where the pest situation requires regular control measures (e.g. parasitoids of scale insects), they should be introduced, if available and effective.</p>	
<p>9.5 Application and recording of pesticides</p>	<p>All pesticide applications must be registered with name, date, crop-pest / crop- disease combination, dosage and field identification where applied.</p> <p>Buffer zones of adequate size between treated crop areas and sensitive off-crop areas, (surface water, springs, ecological infrastructures), must be observed, (see point 2.6).</p> <p>The official pre-harvest intervals to minimise pesticide residues must be followed and should, if possible, be extended. They must be recorded for all applications of crop protection product and evidence should be provided that they have been observed. In situations with continuous harvesting, systems must be in place in the field to ensure that safety rules are sufficiently followed (e.g. warning signals).</p> <p>Spraying during windy weather conditions when wind velocity is exceeding 5m/sec, is not allowed.</p>	<p>It is strongly recommended that the application of pesticides is limited to the smallest possible area (e.g. band spraying, spot treatments, field and site specific localized treatment).</p> <p>The use of best application techniques available to minimize drift and loss is highly recommended.</p> <p>Small untreated areas, (zero treatment or "spray windows"), should be maintained in each crop and in each major plot/field except for arthropod pests, diseases and weeds declared as "highly dangerous/ contagious" by national authorities or in cases with high infectious pests or diseases.</p> <p>Perennial crops: The use of methods to calculate the right dose of pesticides and spray volume to be applied as a function of the plant growth stage and canopy architecture - such as for instance the TRV (Tree Row Volume) or the LWA (Leaf Wall Area) methods – is highly recommended. Always explore this keeping in mind the specific properties of each pesticide-active ingredient.</p> <p>Adaptation of pesticides doses to the real treated area and not to the cadastral area, and possibly to the foliar surface area instead of the soil surface.</p> <p>The variable-dose approach, based on vigour maps, or on monitored or forecasted risk level is advised.</p>
<p>9.6 Efficient and safe storage and handling of pesticides</p>	<p>The basic requirements of Good Agricultural Practice (GAP) with respect to storage (9.6.1), safe handling application and training (9.6.2) and disposal of surplus mix, obsolete pesticides and empty containers (9.6.3), must be fulfilled and outlined in IP guidelines.</p>	
<p>9.6.1 Storage</p>	<p>Pesticides must be stored in accordance to legal regulations, in a locked room and separated from other materials. Keys and access to the pesticide store must be limited to workers with formal training in the handling of pesticides. Pesticides must only be stored in their original package.</p>	
<p>9.6.2 Safe handling, application and training</p>	<p>There must be adequate facilities for measuring, mixing and filling the products.</p> <p>Adequate emergency facilities, such as running water, eyewash facilities, first aid box and emergency procedures, must be provided to deal with potential operator contamination.</p> <p>Operators must have appropriate protective clothing and equipment for all operations involving chemicals.</p> <p>All sprayer operators must have appropriate training and hold, where relevant, the appropriate certificate of competence.</p>	
<p>9.6.3 Disposal of surplus mix, obsolete pesticides and empty containers</p>	<p>Surplus mix or tank washings must either be sprayed onto a designated untreated part of the crop or disposed of by a registered waste contractor or applied in a biodegradation unit.</p> <p>The safe disposal of spare pesticides must be planned and recorded. They must only be disposed of through an approved chemical waste contractor. Empty pesticide containers must be rinsed with water three times and the rinse water returned to the spray tank. Empty containers must not be re-used but should be crushed or perforated to prevent re-use</p>	<p>Under normal circumstances surplus spray mix should not occur. However, if surplus should occur, disposal must comply with local regulations. Applications onto designated fallow land should demonstrate that this is legal practice and that there is no risk of surface water contamin</p>
<p>9.7 Spraying equipment (pesticides) and technique</p>	<p>The basic requirements of Good Agricultural Practice (GAP) with respect to the operation and maintenance of spray equipment must be fulfilled and outlined in IP guidelines.</p> <p>The equipment must be kept in a good state of repair. Adequate functioning of the equipment must be verified before each treatment. A thorough technical service of the equipment, (especially manometers and nozzles), should follow the national rules and obligations.</p> <p>Equipment must be verified every 4 year (3 years from 2021) or according to the national guidelines by a competent organisation for correct operation and calibration.</p>	<p>The use of drift reduction techniques with the least drift and pesticide loss should be encouraged whilst maintaining efficacy.</p> <p>When new sprayers are purchased, transverse flow design, or sprayers allowing treatment of each side of the row should where possible be selected. Atomizers must be equipped with stop drop system on the nozzles.</p>

	<p>The use of aircraft and helicopters is forbidden, except for situations where access to the plot is impossible because of exceptional weather conditions, or if plot topography allows no other way of spraying.</p> <p>Radial flow air assisted sprayers traditionally used for tree and bush fruit spraying are often inefficient and generate high levels of spray drift. Wherever possible spraying equipment and spraying conditions minimising the health risk of the operator and drift must be preferred and tractors must be fitted with a cab.</p> <p>The spray impact on the environment can be minimised by the proper calculation of the amount of product needed per ha.</p>	
9.8 Pesticide residues	Legal requirements of pesticide residues must be fulfilled.	

—	Strict Rules	Recommendations
---	--------------	-----------------

10. Harvest	<i>Harvest practices must fulfil the general requirements for product quality, food safety and traceability established by national or international standards. Selected must items see below.</i>	
-------------	--	--

10.1 Product quality	<p>In order to produce high quality olives regional/national guidelines have to define the correct timing of harvest. The olive fruit can be harvested mainly directly from the tree after artificial or natural falling on nets.</p> <p>In case of natural falling the olives have to be collected at maximum weekly. The olive fruit falling on the ground have to be managed separately and cannot be IP labelled in any case.</p> <p>When mechanical harvest is applied olives fruits should be harvested minimizing damages to fruits. The interval between harvest and milling has to be minimized and recommended in regional guidelines. A maximum interval of 4 days is generally required with exception for special conditions to be clearly defined and justified. Containers must be rigid and open (bags are not allowed) and have to be stored in dry and hygienic conditions avoiding completely the presence/contact with hydrocarbons (e.g. gasoline).</p> <p>Damage to olive trees caused by mechanical harvesting could create conditions favourable to <i>Pseudomonas</i> infections: regional guidelines should include specific recommendations.</p> <p>The same preventative method to avoid damage described for oil production should be applied taking special care to avoid also aesthetic damage. At this purpose mechanical harvesting should be avoided.</p>	The necessary measures to obtain optimum product quality at harvest should be defined for each crop taking into account actual national and international standards for external and internal quality.
----------------------	---	--

10.2 Hygiene	<p>All staff must be aware of the need to harvest, transport, store and pack produce with the utmost care having received basic training in personal hygiene requirements for handling of fresh produce.</p> <p>A documented and up-dated risk assessment e.g. HCCP covering hygiene aspects of the harvest process and of produce handling operations must be made and hygiene procedures implemented.</p> <p>With regard to other labour conditions ILO (international labour organisation) charts give guidance.</p>	
--------------	---	--

—	Strict Rules	Recommendations
---	--------------	-----------------

11. Post harvest management and storage	<i>Post-harvest handling and storage practices should fulfil the general requirements for product quality, food safety and traceability established by national or international standards.</i>	
---	---	--

11.1 Hygiene	See 10.2.	
--------------	-----------	--

11.2 Post-harvest washing	The water used for washing final produce must have potable quality and recycled water must be filtered. At adequate intervals a water analysis must be carried out by an accredited laboratory at the point of entry into the washing machinery. The levels of the parameters analysed must be within accepted WHO thresholds or must be accepted as safe for the food industry by the competent authorities.	
---------------------------	---	--

--	--	--

<p>11.3 Post-harvest treatments</p>	<p>Treatments with pesticides and other chemical substances must, in general, not be applied to fresh produce for immediate consumption.</p> <p>If there is no alternative to ensure maintenance of good quality of produce destined for longer storage, a selected list of permitted treatments must be established and those eliminated that are in contradiction to the requirements of human health, sustainable production practices and consumers' expectations on natural and healthy food.</p> <p>The record of each treatment must include the justification for the application.</p> <p>IP guidelines must set out which Post-harvest treatments chemicals are permitted, clearly specifying the aim and the restrictions of their use.</p> <p>Mill by-products (vegetable water and pomace) have to be treated to avoid severe damage to the environment. As an alternative they can be returned to the orchard – pomace – after composting and vegetable water is spread in allowing quantities; this increases the organic material and mineral content in soil.</p>	
<p>11.4 Storage and/or further processing</p>	<p>Storage methods must be such as to maintain high internal and external fruit quality. Stores, controlled atmosphere and refrigeration equipment must be maintained to ensure maximum efficiency and must be regularly monitored to ensure correct operating conditions.</p> <p>Accurate records must be kept and made available for inspection.</p> <p>Product in store should be regularly monitored for external and internal condition and firmness.</p>	

—	Strict Rules	Recommendations
<p>12. Energy use, GHG emissions and waste management</p>	<p><i>GHG emissions from agriculture need to be reduced, specifically Methane (CH4), Nitrous oxide (N2O). Emissions from agriculture constitute more than 50% of the EU emission of these gasses. Also the Carbon dioxide (CO2) emission needs to be lowered. Agriculture has also a unique opportunity to sequester Carbon in soils. All amounting to a lower carbon footprint of the farm and the produce. Methods to reduce the carbon footprint and to sequester carbon in soils (see chapter on soil cultivation etc.) and long term biomass like woods (> 50 years) should be included in IP methods. The evaluation of such emission should be based on LCA methods to calculate emissions from cradle to farmgate in terms of CO2 equivalent (farm or produce).</i></p>	
<p>12.1 Energy use and renewable energy</p>	<p>IP guidelines have to specify efforts to reduce energy use.</p>	<p>Apply the techniques that reduce the direct energy consumption and indirect consumption through purchase of inputs and use wherever possible renewable energy (biogas, solar and wind energy, etc.) to substitute non-renewable sources of energy.</p>
<p>12.2 GHG emission reduction</p>	<p>IP guidelines have to specify efforts.</p>	<p>Effective and efficient mitigation methods to reduce GHG emission should be applied that do not reduce productivity (both in terms of quality and quantity). Specifically the following strategies should be evaluated and eventually adapted (see also the other chapters of these guidelines):</p> <ul style="list-style-type: none"> • Agrochemical input reduction (pesticides and notably mineral fertilizers). • Soil management (directed on improving soil structure) minimal tillage. • Organic matter management, (crop residues, green manures, soil cultivation techniques, crop choice and rotation). • Best practice of organic manure processing (e.g. biogas) and management/distribution (e.g. very fast incorporation or injection in soil). • Mechanisation, reduce number of operations, fuel use, low energy consuming irrigation, etc. • Energy use in storage and processing.
<p>12.3 Carbon sequestration</p>	<p>IP guidelines have to specify efforts.</p>	<p>Optimize organic matter input (including crop residue) and soil management in order to result in a positive organic matter balance and thus in sequestration of CO2. Possibilities are dependent on the actual organic matter status of the soil.</p> <p>Crop residue (such as residue from pruning and foliage has to be</p>

		left within the orchard) or taken up in the farm nutrient cycle. Same applies for mill by-products.
12.4 Waste management	IP guidelines have to specify efforts.	Each farm should keep a waste register and develop and implement its sorting and recycling (farm recycling) find alternatives for non degradable materials.

	Strict Rules	Recommendations
13. Plant production on mixed farms	<i>Animal and crop production are interrelated components of mixed farms.</i>	
13.1 Agronomic aspects	<p>For the production of annual and perennial fodder crops: see specifically the general rules of chapters on fertilization and crop protection.</p> <p>Animal density: A maximum livestock density of 2.0 Livestock Units (LU) /ha must be observed in order to avoid excessive amounts of manure that would offset balanced nutrient cycles (especially of P).</p> <p>Mandatory laws on stock density have to be followed.</p>	
13.2 Animal welfare	<p>Holding conditions for farm animals must satisfy at least national legal regulation. However, farms operating at higher quality levels need to consider ethical aspects, especially the welfare of the farm animals.</p> <p>All veterinary treatments should be recorded.</p>	

	Strict Rules	Recommendations
14. Worker's health, safety and welfare	Any organization that seeks endorsement of IOBC for their guidelines should be able to demonstrate that they follow basic international standards on workers safety, health and welfare. Appropriate standards are those outlined in the Declaration of the International Labour Organisation (www.ilo.org), an organisation of the United Nations.	

IOBC-Global

The International organisation for Biological Control (IOBC) promotes environmentally safe methods of pest and disease control.

[To Website](#) →

Important Links

[Privacy Policy](#)
[Legal Notice](#)
[Imprint](#)

Want to be the first to know?

Follow us on social:



Jobs

The IOBC-WPRS website offers the opportunity of drawing attention to job opportunities, internships, post-docs, studentships etc.

[Read more](#) →