

Guidelines for Integrated Pome Cultivation 2011

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AGRIOS

Workgroup for Integrated Fruit Production in South Tyrol
Haus des Apfels, Jakobstraße 1A, I-39018 TERLAN (BZ), Italy

GUIDELINES **FOR INTEGRATED POME CULTIVATION**

These guidelines consist of technical recommendations on the one hand and on the other, of mandatory obligations which must be fulfilled in order to obtain certification. For clear identification, the latter are printed in **red lettering** and are additionally emphasized by a **red frame**.

1. What is Integrated Production and what is its goal?

Under integrated production we understand an agricultural production system for foodstuffs which uses all methods and production measures as well as remedies for pests in a way that reduces the use of chemical-synthetic measures to a bare minimum in compliance with ecological, economical and toxicological principles as well as rationalizing fertilization.

Integrated cultivation is the economically successful production of quality fruit with the best possible protection of man's health and environment. Natural measures are preferred in order to keep the use of agrochemicals to a minimum.

2. Technically schooled, environmentally conscious producers

Good **technical training** and a **positive attitude** towards environmental protection and protection of the consumer are important conditions for integrated cultivation. To achieve this, AGRIOS uses lectures and news letter to make the program understandable to its participants and to keep them informed about the continuation of developments in integrated fruit production.

Further, for the realization of a serious IP program a practice-oriented **research institute** and an efficient **advisory board** are indispensable. Also, the persons responsible for fruit marketing must show understanding and interest for integrated production and support the program in their area of responsibility.

Producers must be professionally competent (agricultural-technical education or at least five years of work experience).

In addition, they must prove that all of the production areas cultivated according to the guidelines for integrated fruit cultivation are registered with an advisory organization. If they are members of a production organization, the organization must, as per EU market regulations, have a convention for professional advice through this advisory organization.

Justification: according to the national strategy for 2009-2013 regarding implementation of Regulation (EG) No. 1234/2007 (Art. 125b, Paragraph d) about the collective market regulation, integrated production can only be promoted if the producers are supported by a service for technical assistance.

Each orchardist must attend at least two hours per hectare of job-related further education courses concerning the topic of integrated cultivation. Orchardists who cultivate more than ten hectares must attend at least 20 hours of further education. The participation in further education courses must be listed and included in the orchard register.

3. Ecological measures

Integrated production concentrates not only on chemical plant protection, but also on the cultivation measures as a whole. Gentle cultivation practices have a positive effect on the orchard and the environment. It should be the concern of every farmer who decides to practice integrated production to implement as many of these measures as possible. That is why AGRIOS proposes a series of these ecological measures for the orchardist.

As **many of the items** chosen from this list should be realized in each **year of cultivation**. The points effected must be recorded in the orchards register.

Choice of cultivar and planting system:

- A new orchard with a fungus-resistant cultivar is planted.
- Single row planting is chosen at the time of planting. This system of planting guarantees good light for the fruit during the entire growing season. Single rows require less use of plant protection products (especially reduce herbicides) than multiple row systems and allow alternatives to chemical strip treatments.

Fertilization and soil management:

- Nitrogen fertilization is effected after N-min tests (analysis must be enclosed).
The N-min test determines the existing share of mineral nitrogen (nitrate and ammonium) in the soil. On the basis of humus content and soil type, the nitrogen replacement value of the tree row is estimated and finally, using these two values, the nitrogen fertilization is calculated.
- Early leaf analysis is effected in the orchard.
Early leaf analysis made at the time the main growth period is ending gives a good picture of the nutritional condition of the tree. Imbalances in the tree's nutrition can be temporarily stabilized using leaf fertilization. Long-term fertilization must be made through the soil.
- The tree strip is kept green the whole season and/or is kept free of grass using alternative methods without herbicides.
As far as the tree growth and the natural nitrogen delivery allow, the lanes and tree strips should be kept green all year. This leads to bonding of nitrogen, which is useful especially in orchards with vigorous growth.
- The lanes are mulched alternately.
If every other lane is mulched and at the same time the nitrogen dosage is reduced, the ground cover develops a larger variety of foliage and grasses. Blooming ground cover is an important source of nutrition for many beneficial insects (chalcid wasps, hoverflies, etc.)

One or more of the following biological or biotechnical defense mechanisms must be applied in each year of cultivation:

- Mating disruption against codling moth and oriental fruit moth.
- Ground nets in orchards subject to May bug infestation.
- Juice traps to fight clear wing borers. Only young clear wing moth larvae can be satisfactorily controlled using insecticides. Besides that, this method of control is technically impossible and ineffectual for older trees. A large part of the moths can be caught using juice traps
- Nesting boxes are set up in the orchard to attract titmice. These and other insect-eating birds collect many larvae during the nesting period and in this way help to reduce the population of pests.
- Hiding places for weasels, hedgehogs, shrews or grass snakes are created in the orchard (rock piles, pipes, stick piles).
- Predatory mites are introduced into the orchard.
- Growth affected by mildew or aphids is cut off in spring.

Pest control:

- Pheromone traps are placed and the moth catches are regularly registered (documentation must be included). Pheromone traps offer the possibility of observing the flight course of important pests (i.e. apple codling moth, oriental fruit moth, tortrix moth). Correct interpretation of all data (peak and length of flight, weather, laying of eggs) can help in making a decision. With the help of pheromone traps, a negative prognosis is possible. Note: As different traps have varying ability to catch insects, the orchardist should turn to an expert in case of difficulty in interpretation.

4. Care of the orchard environment

The orchardist should also protect and care for the environment surrounding his orchard in accordance with integrated cultivation. Bushes, dry walls, rock piles or embankments serve as shelter for many beneficial animals and must not be sprayed with pesticides and herbicides or burned.

5. Choice of cultivar according to habitat

When planting new orchards, the orchardist should choose for each location the fruit cultivar which because of its natural qualities offers the best chance for regular crops and good quality. Additional spraying or other environmentally damaging measures used in order to improve quality should not be necessary.

In choosing new varieties, preference should be given to those which do not require post-harvest treatment for long-term storage.

6. Choice of planting material

The use of seed stock deriving from genetically modified organisms is not allowed.

The orchardist should always strive to plant healthy, virus-free trees from selected mutants. The desired characteristics of fruit quality should be taken into consideration when choosing planting material. This makes questionable "cosmetic" corrections with chemicals at a later date superfluous.

New plantings must consist of certified planting material when available. If such material is not available, CAC material must be used.

When new orchards are planted, the EU health certificates for all plant material used must be filed in the orchard register.

If self-made planting material is used, the legal minimum standards must be met and the origin of the original material must be documented.

To prevent the occurrence of Fireblight, plant material accompanied by ZP b2-Plant Passport should be used where available.

7. Choice of planting system

In new orchards, planting systems which allow the lowest possible use of herbicides and an efficient distribution of plant protection products are preferred.

Considering this, single row planting is preferable.

The **planting distance** should be measured in a way that the chosen combination of variety and rootstock has enough room to grow without using severe pruning or synthetic plant growth regulators.

Tree height and depth should allow enough light penetration for fruit growing in the center of the tree.

8. Fertilization

The goal of fertilization in integrated production is to cover the nutrient requirements through natural cycles. Soil analysis is the most important basis for the fertilizer dosage of phosphate, potassium, magnesium, boron and other nutrients.

Sampling: intervals and times

For every registered orchard (except from the land register) is required a soil analysis. A soil analysis certificate is valid for **exactly 5 years from the date of issue**. Should the execution of soil analysis not be possible for various reasons within the period of validity, there is an **additional tolerance of 2 months**.

Exceptions: Orchards made up of various parcels which demonstrate provable similar soil composition and supply rates and are cultivated similarly need only supply a soil sample from a representative area. If the parcels are different in soil composition (structure) and in nutritional content, a correspondingly greater number of soil analyses per orchard is necessary. Mixing of soil samples from various parcels is not agronomically wise. This makes a proposition for targeted fertilization impossible.

Following fertilization or soil working, an adequate period of time must elapse before soil samples are taken.

At the creation of new orchards, we recommend making soil analysis in any case.

Leaf and fruit analyses are necessary to determine deficiencies or excesses of nutrients in the plant or to clarify problems with internal fruit quality.

The **dosage of fertilizer** is determined by the nutrient levels in the soil and the needs of the plants. Soil and leaf analyses show especially well which type of fertilizer is needed for the specific site.

Overfertilization is to be avoided in the interest of maintaining the resistance of the fruit trees, the quality of the fruit, and the environment (ground water). The N-min test delivers clear indications of the amount of plant-usable nitrogen in the soil. The shoot length as well as the color and size of fruit and leaves can also be used in determining the nitrogen needs of the plant. Too much nitrogen makes the background color dark and foreground color is lacking, too much potassium increases the danger of bitter pit.

Nutrient removal (guideline values)

Annual removal of principal nutrients (kg/ha) in apple cultivation with a crop yield of 40 t/ha, distributed over the various plant organs.

	Nitrogen (N)	Phosphorus (P ₂ O ₅)	Potassium (K ₂ O)	Calcium (CaO)	Magnesium (MgO)
Fruit	28	11	60	5	4
Leaves	40	6	50	80	25
New shoots	10	3	6	20	2
Trunk, branches and roots (older parts)	15	8	15	50	3

Fertilizer dosage is measured according to the following parameters:

Nitrogen fertilization

Addition of nitrogen	1 st year	2 nd year	> 2 nd year Crop yield (t/ha)		
			< 32	32-48	> 48
Nitrogen kg/ha	40	80	50	80	110

If soil conditioners are used in the current year, nitrogen is calculated at 30%.*

* For soil conditioners (manure, compost) it is important to consider the mineralization which the organic mass is subject to. If, for example, manure with a nutrient content of 200 kg N, 120 kg P₂O₅ and 280 kg

K_2O is applied, it must be taken into consideration that only 30% of this amount, that is, 60 kg N, 36 kg P_2O_5 und 84 kg K_2O is available in the first year.

Amount of nitrogen which can be added to the standard dose depending on the corresponding conditions:

• By low supply of organic matter	+ 20 kg/ha
• By low growth	+ 20 kg/ha
• By surplus of precipitation	+ 20 kg/ha

Amount of nitrogen which must be subtracted from the standard dose depending on the corresponding conditions:

• By addition of organic fertilizers in the previous year	- 20 kg/ha
• By excessive growth	- 20 kg/ha

In any case, the maximum addition of nitrogen allowed lies at 140 kg/ha/year.

To keep losses due to washout to a minimum and to attain the largest possible effectiveness of fertilization, it is necessary to apply the nitrogen during the phase of greatest demand, and, in the case of larger amounts, to distribute the amount over several applications. If the amount needed is more than 60 kg/ha, it must be allocated in multiple applications.

Phosphorus fertilization

Supply of phosphorus	1 st year	2 nd year	> 2 nd year Crop yield (t/ha)		
			<32 t/ha	32-48 t/ha	>48 t/ha
A+B (low supply)	15	40	45	55	65
C (normal supply)			30	40	50
D+E (high supply)			25	35	45

Amount of P_2O_5 which can be added to the standard dose:

• By low supply of organic matter	+ 10 kg/ha
• By soil with high lime content	+ 20 kg/ha

Amount of P_2O_5 which must be subtracted from the standard dose:

• By addition of organic fertilizer	- 10 kg/ha
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Before planting and during the vegetative period:

- For classes A+B without preliminary fertilization before planting max. 65 kg/ha/year for 5 successive years.
- In any case, even when supplementary or preliminary fertilization is implemented, it is not allowed to exceed 250 kg/ha P_2O_5 per year.

The annual amounts necessary can also be accumulated and applied every second or third year.

Potassium fertilization

Supply of potassium	1 st year	2 nd year	> 2 nd year Crop yield (t/ha)		
			< 32 t/ha	32-48 t/ha	>48 t/ha
A+B (low supply)	40	90	115	150	185
C (normal supply)			55	90	125
D+E (high supply)			20	50	85

Amount of K₂O which must be subtracted from the standard dose:

• By addition of organic fertilizer	- 30 kg/ha
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Before planting and during the training phase:

- For classes A+B without preliminary fertilization before planting max. 180 kg/ha/year for 5 successive years.
- In any case, even when supplementary or preliminary fertilization is implemented, is it not allowed to exceed 300 kg/ha K₂O per year.

Magnesium and boron

Nutrient requirements in kg/ha by a crop yield of 60 t/ha, determined on the basis of soil analysis. Source: Laboratory of the Laimburg Research Center (BZ)

Supply class	MgO	Boron
A+B (low supply)	30-50	0,7-1,4
C (normal supply)	20-30	0,5-0,7
D+E (high supply)	0-20	0-0,5

The actual amount of fertilizer applied is to be recorded in the orchard register.

Routine spraying with leaf fertilizer do not bring economic advantages in well-supplied orchards and are as such to be avoided. An oversupply through the leaves can cause problems in fruit quality.

Sludge and compost as well as fertilisers which contain toxic or soil-contaminating components or which bring up hygienic reservations are not allowed in integrated cultivation.

All equipment used to apply fertilizer must be appropriate for the respective purpose and be kept in good condition. This includes regular maintenance as well as annual inspection and calibration to insure that the desired quantities of fertilizer are in fact applied. This maintenance must be recorded in the maintenance plan added to the orchard register.

Chemical soil decontamination is not allowed in integrated production.

9. Care of the lanes and rows

In orchards with vigorous growth, the rows should be left **green throughout the year** and mulched along with the lanes (mulcher with swivel arms) or the area around the trees should be mowed.

A mulch cover before harvest reduces the nitrogen supply and promotes fruit quality as well as reducing the nitrate reserves at the end of the vegetation period.

A mulch cover of low and flat-rooted plants in the rows (that is, competing with the trees neither over nor under the ground) is to be considered ideal.

Covering the area under the trees with tree bark keeps the ground damp, suppresses grass growth and reduces erosion, and is thus to be considered favorable. This measure can however favor the settlement and reproduction of field mice. This must then also be checked and fought.

Mechanical treatment of the rows is also an environmentally-friendly solution.

In **areas of vigorous growth**, no herbicides should be used.

In **single row orchards**, the **area treated with herbicides** must not be more than 70 cm wide, may however be up to a maximum of one-third of the planting distance between rows.
In **multiple row orchards**, treatment is only allowed on the area covered by trees plus 35 cm per edge row.

Where orchards in the zone infested by May bugs are covered by ground nets, a universal spraying of herbicides is allowed.

The frequency of mulching for **care of the lanes** should depend on the characteristics of the orchard (tree growth, soil type, water balance). By vigorous tree growth and wet weather, 3-4 rounds a year should suffice.

Less frequent mulching allows for more variety of ground cover plants. Blooming plants are an important **source of nutrition for many beneficial insects** (parasitic wasps, hoverflies, etc.).

When products dangerous to bees are used, blooming ground cover must be mowed first.

10. Irrigation

The water requirements of the culture are covered through irrigation without exceeding the field capacity in order to stem water waste, nutrient washout and the development of pests.

Through irrigation, natural precipitation is complemented to reach the minimum needs of the fruit trees. The application of irrigation should correspond to the actual requirements (use tensiometer or other instruments of measurement!). The amount of water should depend upon the deficiency of precipitation as well as on the acqueosity (field capacity) and the profundity of the ground.

If technically possible, the use of fertigation is recommended in order to increase the effectiveness of the fertilizer and to reduce washout.

For every orchard in production, the following data must be recorded in the orchard register:

1) Irrigation date and amount:

- Overhead sprinklers - date and amount of each individual irrigation; the amount of water is determined as follows:
 - by reading the rain gauge,
 - by reading the gauge on the water supply lines of the individual properties,
 - by calculation of the amount of water applied per hour
- Drip irrigation: irrigation amount for the total culture cycle (or shorter period), citing beginning and end of irrigation.

If irrigation is realized collectively or through consortiums, the above mentioned data can be supplied through those organizations.

2) Precipitation data: readable through rain gauges or weather stations or through data supplied by weather services. (Production operations with a cultivation area of less than a hectare and areas with drip irrigation are exempt from the recording of these data.)

3) Irrigation amounts:

By each implementation of irrigation, the producer must not exceed the following maximum amounts, depending on the soil type:

Soil type	Millimeter	m ³ /ha
Light soil	35	350
Medium soil	45	450
Heavy soil	55	550

Frost irrigation is exempt from the above mentioned regulations.

Excesses in additional irrigation are to be warned against, as these lead to excessive growth, lower fruit quality, nutrient erosion and contamination of ground water.

Excessive irrigation in late summer can, in connection with excess nitrogen, cause a lack of woodiness and result in winter frost damage in sensitive varieties.

Exaggerated irrigation in summer can also promote scab (water on leaf longer and fungicide is washed off).

All possibilities for efficient use of water resources should be exhausted; for example: night irrigation, repair of leaks, reduction of the water amount per irrigation period, etc.

Where possible, drip irrigation should be preferred.

Water quality:

Since 1997 the water resources available for fruit production have been regularly analyzed in a monitoring program by the department of water resources of the autonomous province of Bozen. Because of the natural conditions, the catchment area is harmonious and comparable. Because of the implementation of the plan for building sewage treatment plants for urban wastewater, general water quality has risen.

Since 2001 all water resources usable for irrigation comply with the requirements. Therefore additional testing of water quality is not necessary.

The necessary documentation has been prepared for the producer organizations and has been made available.

Sewage water must never be used for irrigation.

11. Tree training and growth management

Yearly growth of 20-40 cm. is desirable. In the case of more vigorous growth, appropriate measures (adjustment of winter pruning, reduction of nitrogen fertilization, reduction of irrigation, root pruning and ground cover propagation under the trees) can inhibit growth.

12. Fruit quality and crop management

Regular, good-quality crops are indispensable for economic success in commercial orchardry. That is why the orchardist should always try to better fruit quality (fruit size, color, taste, internal quality, shelf life and hygiene) by the use of environmentally friendly measures. Many varieties require chemical fruit thinning (allowed products - see appendix). Thinning surplus, small, deformed or otherwise damaged fruit by hand is an especially good method of improving fruit quality.

For reduction of russet, only kaolin as well as gibberellins and Benziladenin are allowed. Synthetic products which speed up or slow down ripening are not allowed.

13. Integrated crop protection

a) Prevention

The entire cultivation program should be aimed at maintaining the trees' natural **resistance** against diseases and pests so that no additional spraying is necessary. Trees with too vigorous growth, for example, are especially susceptible to scab, mildew, aphids, mites, and codling moths.

Integrated crop protection means further protecting and promoting **natural enemies** of pests.

In the interest of **natural protection of species** and to promote the settlement and reproduction of beneficial animals in the orchards, we recommend the following measures:

- At the edges of the orchards, **hedges and bushes** should be left as shelter and breeding places for many species.
- Dry walls are welcome **shelter** for weasels, hedgehogs, shrews, various snakes and other beneficial animals. The same is true for rock piles, wood piles, and similar hiding places.
- To attract **birds of prey** (buzzards, falcons, owls, etc.), perches should be installed in the orchards above the trees. Birds of prey keep the orchard clean of mice.
- **Insectivorous birds** (titmice, wrynecks, tree sparrows, redstarts, hoopoes, etc.) collect many larvae (winter moths, clouded drab moths, clear wing borers, and tortrix moths), especially during nesting. We recommend hanging nesting boxes (entry hole 32, 45 or 55 mm) in the orchard.
- **Predatory mites**, if properly protected, keep spider mites under control in the orchard with the help of spider beetles and minute pirate bugs. If there are not enough predatory mites in the orchard, these should be carried in on bundles of branches from other orchards.
- Pots or boxes filled with straw or wood-wool can be hung up in the orchard as winter quarters for **lacewings** (Chrysoperla).

b) Alternative plant protection measures

In integrated production, **alternative** (non-chemical) **products and measures** are to be given preference.

- **Shoots infested with mildew or aphids should be cut off.** Thus the intensity of infestation can be reduced and the success of abatement can be improved.
- **Mating disruption** should be used where codling moths and/or oriental fruit moths are present. At low infestation rates, reduction of the population is achieved, and prevents the problems that an increase in the population involves. This biotechnical method makes it possible to avoid or reduce spray applications thus avoiding or at least delaying resistance.
- **Alcohol traps** (8 per ha) are the most effective methods of fighting the European shot-hole borer (Anisandrus).
- **Mass reproduction and release of beneficial insects** (San José parasitic wasps, woolly apple aphids Trichogramma, parasitic mites, etc.), is more effective over a long period of time than chemical controls.
- In the sense of good agricultural practice, trees with clear symptoms of apple proliferation should be stubbed without delay. If field inspections reveal trees with symptoms of apple proliferation, the member will be asked to stub the trees after harvest.

c) Resistance management

Resistance of harmful organisms can make plant protection very difficult and lead to serious problems in regulating harmful populations. All possible precautions should be taken to prevent eventual building up of resistance. The goal of integrated production is to use all non-chemical possibilities and to include or integrate them. IP is through consequential adhesion to its principles suited from the very start to prevent and/or delay resistance of harmful organisms.

The most important principles of a program aimed at resistance management are briefly described below:

- **Reduction of crop protection products use:** Each action that can be avoided delays resistance. If a treatment becomes necessary, the active ingredients should be chosen and used with care. This requires a good knowledge of biology and of the occurrence of the harmful organism. The choice of the correct product and time of use, the right dosage and well-aimed application lead to optimal results and usually avoid the necessity of follow-up treatments. Insecticide application should be limited to the area of infestation.
- **Avoidance of a permanent spray layer:** Effective layers of spray should remain on the tree and in the environment only as long as absolutely necessary. Even short-lived active ingredients which are used repeatedly within short intervals result in a permanent spray coating. Long-lived, persistent active ingredients should be used sparingly and suited to the period of damage.
- **Use of alternatives:** This is a basic requirement of integrated plant protection. Included in these methods are for example pheromone traps, *Bacillus thuringiensis*, June bug nets, natural enemies (predatory mites) etc.
- **Protection and promotion of beneficial organisms:** Beneficial organisms occupy an important place in resistance management. Their regulatory effect on harmful organisms helps to avoid treatment. Independent from degree and mechanism of resistance of the pests, beneficial organisms destroy them and counteract the selection of a resistant population.
- **Substitution of active ingredients:** A well-considered change of active ingredients used can delay development of resistance over a long-term period. Decisive is, however, that the actual method of effect, that is, the killing mechanism, is changed. The active ingredients used should therefore belong to different groups (i.e. chitin synthesis inhibitors, phosphorous ester, carbamate, etc.). As far as possible, the program offers choices.

Resistance management must begin as long as the products are still working. According to present knowledge, some active ingredients are because of their characteristics especially prone to building up resistance. The use of these is therefore to be limited (see the active ingredient list in the appendix).

Acaricides should not be necessary in an integrated program because of consequential protection of predatory mites. Limited use of these products can preserve the full effect of them for those cases where, because of several reasons, acaricide treatment is required.

Well-considered and consequential resistance management is in accordance with integrated production and is the prerequisite for its long-term success.

d) Choice of products

The **goal of integrated plant protection** is to guarantee the economical success of the orchard using as little and as environmentally-friendly plant protection products as possible.

Chemical measures should only be implemented in integrated plant protection when necessary.

The orchards must thus be checked for disease, pests and beneficial organisms at the most important observation dates (at least three times a year, of which at least once a year for beneficial organisms). Per hectare of registered area, annual field checks of at least 12 hours must be made. The checks and the results of the counts must be recorded in the orchard register.

Out of the list of legally allowed plant protection products, those which:

- do not endanger the **user** or the **personnel working in the orchard**,
- reduce the pest population under the **threshold of tolerance**, yet protect beneficial organisms and other animals,
- do not unnecessarily pollute the **environment** (soil, water, air), and
- leave few **residues** on fruit and in the environment should be preferred.

Products harmful to **predatory mites** should also be avoided. A maximum of 5 applications with dithiocarbamates per year is allowed. Further, the intervals between spraying with these products must be kept longer, and they must be used alternately with other fungicides.

Where spraying against spider mites is necessary, the biological balance between this pest and its natural enemies is disturbed. In this case, the use of dithiocarbamates and other products harmful to beneficial insects must be limited, above all in order to guarantee the protection and promotion of predatory mites and other enemies of spider mites (spider beetles, minute pirate bugs, etc.).

In orchards where selected pesticides are used, beneficial insects can live and thrive. Above all the inconspicuous species (i.e. chalcid wasps) often escape our attention.

In the appendix to these guidelines, the active ingredients are listed which are allowed in integrated production.

Crop protection active ingredients which are not listed here are not allowed in the program. In the course of the year, it is possible that other active ingredients are added to the list when needed.

e) Plant protection product use per ha and year

The amount of plant protection products used in an orchard per ha and year is determined by 3 factors:

- **Dosage:** In principle, the lowest possible dosage needed to push the pest population under the threshold for tolerance should be used when applying products.
100-percent extermination of a pest is not in accordance with integrated plant protection. It is relatively expensive, promotes the development of resistant species and damages the environment more than is necessary.
- The **amount of spray** per ha depends on planting system, tree height and spray concentration. Using normal concentrations, it should not exceed 500 liters/ha/meter of tree height in a single row system. When using a fine spray system with high concentration, the spray amount should be reduced accordingly.
- The number of applications per year must be justified by the pest population (threshold of tolerance), the weather conditions (for example with scab) as well as by the estimated crop loss (economical threshold of damage). Tips as to thresholds for intervention concerning various pests are given in the guideline brochure „Leitfaden zum integrierten Pflanzenschutz“ of the South Tyrolean Advisory Service for fruit and wine growing.

f) Spray application methods

Before the first use of a new sprayer, its spray plume should be calibrated to suit the orchard (planting system, tree height). Environmentally safe spraying methods are indispensable for integrated cultivation. Sprayers with transverse flow sprayers and those with methods of collecting drifting spray and recycling it (tunnel sprayers) cause the least amount of spray drift into the environment.

To prevent unnecessary spray drift onto the ground and into the air, all jets of the sprayer must aim directly at the leaves of the trees. Jets which spray under or above the leaves must in any case be shut down before spraying.

Spraying equipment must be kept in good condition and annually serviced and calibrated to insure exact application of the desired quantity of spraying solution. The maintenance work performed on the spraying equipment (adjustments, repairs, replacement of parts) must be recorded in the appropriate maintenance plan added to the orchard register.

All orchardists are required to have their **sprayers** checked at one of the test stands (Latsch, Lana, Auer) at least every 5 years.

Plant protection measures in integrated protection can only be effected with sprayers which have been controlled in the last five years.

g) Proper storage, application and elimination of plant protection products

Substances must be kept in the original packaging in cool, frost-free, well-aired and well-lit rooms which are safe in case of inadvertent spills. Shelving must be made of non-absorbent material; solid substances must be kept on shelves higher than the fluid substances. The rooms or lockers where plant protection substances are stored must be locked and labelled with the appropriate warning signs. Access must be limited to those persons possessing the necessary training in the use of plant protection substances.

Before the plant protection season starts, a list must be made of the plant protection substances on hand and added to the orchard register.

During the preparation of the spray, appropriate protective clothing must be worn.

If the spray solution has been correctly calculated and the sprayer correctly calibrated, there should be no solution left over. In the case that some **solution remains**, it must be **thinned** with the rinse water **and sprayed in the previously sprayed orchard**.

The orchardist is required to dispose of empty spray packaging and obsolete crop protection products according to the existing provincial measures.

Plastic bags for the disposal of plant protection products and packaging can be obtained from any product dealer. The full sacks can be deposited at local recycling areas or at periodical collections of hazardous waste.

Plant protection substances which are no longer allowed must be labeled and stored accordingly until their disposal.

h) Pre-harvest intervals

The security intervals between the last spray application and harvest required in integrated production are listed in the appendix.

Especially in summer, plant protection products with relatively short waiting periods are preferred.

i) Water protection

While filling the spray equipment with water and preparing the spray mixture, it must be ensured that no part of the solution finds its way onto the ground or into bodies of water.

During application of plant protection measures it is important to be sure that none of the spray solution reaches open water. Therefore, upon planting new orchards, an adequate distance from ditches and streams should be observed. In the use of certain plant protection substances, a minimum distance to watercourses must be kept and the corresponding label recommendations on the packaging must be followed.

14. Unintentional contamination by foreign substances

Fruit from orchards which lie on high-traffic roads can be contaminated by unwanted foreign substances (cadmium, chrome, nickel, tire and other dust) to an unreasonable extent through no fault of the orchardist's.

We recommend in this case planting bushes along national, provincial, and city roads with a lot of traffic in the immediate vicinity of orchards in order to reduce the drifting of harmful foreign substances into the orchard.

When possible, hedges should be planted when new orchards are created.

Danger of spray drift

Where apple varieties with different harvest dates border one another, attention must be paid to spray drift from the neighboring properties. Spray drift shortly before harvest can raise the amount of residues on the fruit.

To keep spray drift on early ripening varieties to a minimum, the last row should only be sprayed on the outer side towards the inside and the fan should be turned off in the last row from mid-June on.

Spray drift into open waters or neighboring biotopes must absolutely be avoided.

15. Delivery to the storage facility

Lots of fruit from integrated cultivation must be clearly labeled as such (on the delivery order and on every bin) upon arrival in the storage facility.

In the storage facility, all lots from one producers are precisely recorded (Date of delivery, number of delivery order, variety, number of bins or boxes, net weight, orchard parcel and so on) through the storage records and by a particular variety code. In this way, a clear overview of all AGRIOS and non-AGRIOS lots in storage.

Upon delivery, a list of all registered producers, orchard parcels and varieties must be available from which the non-issuance or the withdrawal of certifications and the voluntary cancellations are discernable. In this way, unintentional storage of fruit whose cultivation does not conform to the guidelines as AGRIOS products can be avoided.

The controllers can at any moment take samples to have the fruit examined for eventual residues of chemicals or other foreign substances.

16. Treatment and storage of the fruit in the storage facility

In the storage facility, various diseases can occur. The causes are partly of a physiological nature (scald, internal breakdown, bitter pit, lenticel spots and so on) and partly various fungi can infect the fruit and cause great losses.

a) Fungus diseases

Fungus diseases (storage scald, gloeosporium, monilia, penizillium, phytophthora and others) can usually be effectively fought in the orchard. Spring treatments are to be effected exactly and on time in order to prevent primary infestation (scab). The final treatment in the orchard is very important and should coordinate the proper substance with the weather, location and variety. Late infections are in this way largely avoidable.

Tips for hygiene in storage:

- Use clean bins for harvest
- Avoid contamination of the bins by soil, as these represent sources of infection
- Cleaning of storage cells, grading lines and drench facilities

Post-harvest treatment with fungicides is not allowed.

b) Scald

In the susceptible varieties Granny Smith, Red Delicious, Stayman Winesap, Morgenduft, Jonagold, Fuji and Cripps Pink, this physiological dysfunction can appear even after relatively short periods of storage. As a method of preventing scald in many apple varieties, the AGRIOS program also allows treatment with 1-MCP (Methylcyclopropene).

17. Grading and packaging

The handling of fruit from integrated cultivation in the storage facility must be executed in a way which excludes the possibility cultivation of mixing or confusing them with non-AGRIOS lots.

Fruit from integrated cultivation must not be contaminated by foreign substances during emptying (water bath), calibration, grading or packaging.

During grading it must be clearly visible if IP products are being processed or not. This must also be controllable for longer periods of time; **in no case may lots be mixed**. Especially during grading and temporary storage, measures which are performed more often, **labeling of pregraded lots must be made in a way which cannot be changed afterwards**. Also packaging must be clearly recognizable and traceable as to whether the lot comes from an AGRIOS producer or not.

Fruit from integrated cultivation should be packaged and supplied in hygienically harmless, **environmentally friendly packaging**.

18. Participation

Each producer and marketing organization wishing to take part in the AGRIOS program must submit a written application for participation in the program by the 28th of February of each year to a competent and independent certification body in which he declares that he:

- knows the guidelines and voluntarily and autonomously adheres to them,
- allows all necessary controls and analyses and
- recognizes the decisions of the certification body.

Integrated production must include **the entirety of his pome orchards** (environmentally conscious orchardist).

The orchardist must see to it that AGRIOS-properties are not contaminated by forbidden substances (spray remains in the sprayer, spray drift from neighboring properties, etc.).

Each producer or the corresponding marketing organization must submit a current list of the participating fruit production area to the certification body within May 31st of each year.

If there are any changes in the cultivation data in regard to planting data or ownership occur after the original report, these are to be reported to the certification body within 15 days.

19. Exclusions

Exclusion from the program can be effected at the certification body on single properties or the entire orchard.

Partial exclusion, that is, exclusion of a part of an orchard, are accepted only when the affected area within a larger area is clearly distinguishable as a (varietal) sector, and when spray drift to bordering rows can be ruled out to a great extent. Clearly distinguishable are, for example, sectors of trees of approximately the same age in at least 5-6 rows, or sectors separated by natural borders such as roads, ditches, or hedges.

At application for exclusion, a sketch should be presented in which the sector to be excluded from the program and its immediate environment are clearly drawn in and the size of the sector is easily

discernible. The certification body reserves the right to accept the exclusion or to decline it for sectors which are too small. A copy of the exclusion application must be included in the orchard register.

Voluntary exclusion must be effected through the marketing organization before or immediately after the implementation of an unauthorized measure. Applications for exclusion can no longer be accepted after notification of a forthcoming inspection or during the inspection itself.

20. The orchard register

Orchardists who want to comply with the requirements of integrated production must record all cultivation measures in an **orchard register** in order to establish proof of an environmentally friendly method of production. In the frame of the EU regulation 1234/2007, contributions are granted for these methods of production, in which case the records must be retained for at least 5 years for following examination by organs of the European Union.

In the orchard register, the orchardist keeps a continuous record of the various cultivation methods in his orchard.

The following information must be recorded in the orchard register:

- Identification of the orchard
- Begin of blossom (for each variety)
- Start of harvest (for each variety)
- Spray applications: date, product (trade name), amount, reason (i.e. pests, diseases, thinning, etc.)
- Fertilization: date, fertilizer, (trade name), concentration of nutrients, amount
- Herbicides: date, product (trade name), amount
- Control of rodents
- Count of primary scab infection (in 100 shoots/orchard)
- Count of beneficial and harmful insects
- Ecological measures effected

The orchard register must be kept up to date, ready at all times for auditing, and finally be signed by the orchardist.

The **declaration of participation** in the AGRIOS program also includes the period of time **after harvest**. Consequently, those measures effected in that period of time, for example fall fertilization or use of herbicide, must be properly recorded in the orchard register. As these treatments are not usually recorded by the time of auditing, they need to be **added** to the orchard register of the past season **and recorded** on the corresponding pages of the **orchard register** for the new **season**.

21. Controls and Sanctions

a) Range of controls

Farm checks

A specific share (min. 10 %) of the registered participants are controlled during the season by farm checks. The participants to be controlled by farm checks are chosen by the certification body.

Controls of orchard registers

The orchard registers including the orchard register entries of all orchards are controlled in two phases: before starting harvest and after application of the last spraying.

Storage controls

At the beginning of the marketing season, a preliminary examination will be made in each storage facility. During the season, further checkups will be made.

b) Content of controls

The certification body:

- checks the orchard register and its entries for
 - the completeness of its entries.
 - the compliance with the AGRIOS guidelines.
- checks the plant protection equipment for participation in a spraying test within the preceding five years.
- examines the storage facilities for plant protection substances for:
 - adherence to the regulations concerning the proper storage of plant protection products.
 - the actual inventory of plant protection products (concordance with inventory lists, presence of substances no longer allowed).
 - adherence to the regulations for proper disposal of empty packaging and obsolete plant protection products.
- controls in the orchards
 - the concurrence of the area controlled with the area registered.
 - the width of the herbicide strips.
 - the execution of ecological measures.
- takes leaf, fruit, soil and outgrowth samples in order to analyze them for residues of plant protection substances.
- checks the storage facility for:
 - Exact and clear labeling of the AGRIOS products
 - Traceability of the product flow
 - Separation of the product circulation

c) Records of controls

At the examination of the producers and the storage facilities, the technician keeps a protocol which each participant receives a copy of. As the participant is not present at the control of the orchard register, the results are communicated to him by a stamp in the orchard register.

Upon discovery of any nonconformity, the sanctions provided for in the guidelines will be applied.

d) Sanctions for the producers

The non-issuance or the withdrawal of AGRIOS certification for the property/orchard concerned is imposed upon following grounds:

- From the orchard register the use of substances not allowed in the AGRIOS program is ascertained. If it is only a case of a recording error, the producer can make a written declaration within two days of the discovery and request residue analysis at his own expense. If no residues of the substance in question are found, the certification of the corresponding property occurs. If however the residue analysis confirms the records, the certification of the entire farm is not issued/withdrawn.
- From the orchard register the use of plant protection measures (commercial products) is ascertained which are in fact allowed in Italy but not for use in pome fruit production.

- Analyses show residues which exceed the maximum limits allowed by AGRIOS.
- Deficiencies found during the controls have not been corrected within the deadline set.

The non-issuance or the withdrawal of AGRIOS certification for the entire orchards is imposed upon following grounds:

- Participation in controls has been refused or a participant fails to appear for controls without excuse.
- Residues of substances not allowed by the program are found in the analyses.
- The orchard register reveals that the ordinances for the protection of bees have been violated in the current and in the previous year.

A warning with the condition that the deficiencies determined be corrected within a certain deadline is delivered in the following cases:

- When the records in the orchard register are incomplete.
- When documents are missing from the orchard register.
- When the last sprayer test was effected more than 5 years before.
- When the soil analysis is missing or was effected more than 5 years before.
- When the confirmation of registration with an advisory organization is missing (see chapter 2).
- When the storage area for plant protection substances contains products which are no longer allowed.
- When the storage area for plant protection substances does not meet regulations.
- When in farm checks the implementation of a measure (plant protection, herbicide, fertilizer) was detected which was not recorded in the orchard register.

A warning with the condition of attending a course pertaining to the topic within a certain time frame will be imposed in the following cases:

- When the orchard register shows that restrictions of the program regarding applications have not been followed (i.e. number of applications, final dates for certain substances, maximum dosage).
- When in the course of residue analyses a substance is found which is allowed by the program but has not been recorded in the orchard register.
- When the orchard register reveals that the ordinances for the protection of bees have been violated in the current year. If a producer also violated these regulations in the previous year, his entire properties not will be certified.

A warning with the sanction of

**- participation in schooling pertaining to the topic in question within a certain period of time,
- proving the adherence to the legal limit through residue analysis,
- more thorough self-control in the next year including documentation,
is imposed in the following cases:**

- When the orchard register shows that waiting periods are not adhered to.

e) Sanctions for the storage facilities

If any nonconformity is discovered in the storage facility, the following sanctions are provided for:

- The product will be blocked.
- The blocked product must be repacked and/or relabelled.
- The correction measures provided for must be implemented.
- Non-conformity will be relayed to AGRIOS which will apply additional sanctions.

22. Labeling and presentation of the fruit from integrated production

South Tyrolean fruit which is proven to have been cultivated and stored according to the guidelines and has passed all test has the right to use the term “**from integrated production**”.

The orchardist, the persons responsible in his marketing organization and the certification body guarantee with this as far as possible through checks and analyses that the fruit has been cultivated and stored according to the guidelines.

All **liability** for the impeccable soundness of the fruit with regard to the consumer, the business partners and the department of health remains however with the marketing organization and orchardist.

South Tyrolean fruit which has not been **proven** to be cultivated according to the guidelines and is not recognized by the certification body may not use the term “from integrated production” or similar terms. If products from South Tyrol are used for trademarks requiring integrated production, these products must be proven to conform to the AGRIOS guidelines.

Appendix

Choice of plant protection products in the AGRIOS program for integrated fruit cultivation 2010

The choice of plant protection substances is made according to the following principles and criteria:

- Exclusion or (if no effective alternatives are available) strong limitation of use of toxic and very toxic substances (T and T+ classifications).
- Exclusion or (if no effective alternatives are available) strong limitation of use of substances of Xn classification with risk of chronic effects on humans (R40, R48, R60, R61, R62, R63, R68).
- Formulas of classifications Nc, Xi and Xn are preferred if there are also formulas for the same substance of T or T+ classifications.
- Formulas of classifications Nc and Xn are preferred if there are also formulas for the same substance of T, T+ or Xn and risk of chronic effects on humans (R40, R48, R60, R61, R62, R63, R68).

In the AGRIOS program 2011, only those substances are allowed (with corresponding limitations) which are listed in the national guidelines 2010-2011 and in the substance list for integrated pome fruit cultivation 2011. The following lists replace those of the year 2010. Any and all **active ingredients not listed here are not allowed in the AGRIOS program 2011** unless authorized during the year. Use of an active ingredient not allowed in the program or the proof of its use through residue analysis leads to non-issuance or the withdrawal of certification for the respective orchard sector or the entire orchard. The non-issuance or the withdrawal of certification for the orchard sector in question is also effected when plant protection products are used which are not allowed in Italy for the individual plant culture.

Active ingredient rotation: To avoid or delay resistance of harmful organisms, some active ingredients are only conditionally allowed. If possible, rotation of active ingredients from the different groups should be attempted.

Pre-harvest intervals:

The first harvestable date must be calculated with the following formula:

Application date + AGRIOS-waiting period (in days) + 1 day = first harvestable date

Residues of plant protection

Eventual residues of plant protection substances on fruit produced using integrated production may not exceed 50% of the legal limit.

If the analytical limit of determination has been determined as the highest allowable residue content, this value is also sufficient for AGRIOS goods.

Active ingredients for use in organic production

In integrated production, all active ingredients which appear in Appendix II of the ordinance (EC) Nr. 889/2008 for organic production and are authorised for use in Italy may be used.

Using up leftover plant protection substances

Leftovers of plant protection substances which were still allowed in the previous year's IP program may be used up. This exception to the rule is only valid for the amounts of plant protection substances which were already present in storage and registered in the inventory lists. The regulation is not valid for those plant protection substances which are no longer allowed.

Limitations on label: The instructions for use on the labels of plant protection substances must always be followed.

National guidelines for integrated production 2009-2010

Crop protection and weed control
G.T.S. „Comitato nazionale per la difesa integrata”
Ministero per le politiche Agricole Alimentari e Forestali
Ministerial Decree Nr. 2722 - 17/4/2008

Note on the list:

For distinguish the technical recommendations from the mandatory obligations, the latter are printed in **bold lettering** and with **yellow background**.

DISEASE	CRITERIA FOR INTERVENTION	ACTIVE INGREDIENT	REMARKS AND RESTRICTIONS
Scab (<i>Venturia inaequalis</i>)	<u>Chemical measures</u> Implementation of treatments according to biological cycles or a fixed or prolonged cycle in connection with the weather and the persistence of the fungicide. Interruption or strong limitation of scab treatments after the primary scab season, should no scab infestation be found in the orchard.	Copper Lime sulphur Dodine Trifloxystrobin (1) Pyraclostrobin (1) + Boscalid (2) Dithianon Sterol biosynthesis inhibitors (SBI)-see appendix (3) Pyrimetanil (4) Cyprodinil (4) Captan (5) Mancozeb (6) Metiram (6) Fluazinam (7)	(1) A maximum of 3 applications with Strobilurine per year independently of the disease (2) A maximum of 3 applications per year independently of the disease (3) A maximum of 6 applications with SBI per year independently of the disease (4) A maximum of 4 applications per year (5) A maximum of 3 applications per year independently of the disease, for varieties susceptible to russetting (see list) a maximum of 4 applications (6) A maximum of 5 applications with Dithiocarbamates per year (7) Pay attention to the waiting period of 60 days
Mildew (<i>Podosphaera leucotricha</i> , <i>Oidium farinosum</i>)	<u>Agronomic measures</u> Removal of afflicted buds during winter pruning Pruning of afflicted shoots in spring-summer <u>Chemical measures</u> Preventative treatment of susceptible varieties and slope or hill locations beginning pre-blossom, less susceptible varieties in valley locations beginning at the first signs of infestation.	Sulphur Sterol biosynthesis inhibitors (SBI)-see appendix (1) Pyraclostrobin (2) + Boscalid (3) Trifloxystrobin (2) Quinoxifen (4) Bupirimate	(1) A maximum of 6 applications with SBI per year independently of the disease (2) A maximum of 3 applications with Strobilurine per year independently of the disease (3) A maximum of 3 applications per year independently of the disease (4) A maximum of 3 applications per year independently of the disease

DISEASE	CRITERIA FOR INTERVENTION	ACTIVE INGREDIENT	REMARKS AND RESTRICTIONS
European Canker (<i>Nectria galligena</i>)	<u>Chemical measures</u> Normally treatment is implemented in fall shortly before leaf fall and in spring at the first swelling of buds. In young and badly infested orchards, it is sensible to treat during leaf fall.	Copper Dithianon	
Collar Rot (<i>Phytophthora spp.</i>)	<u>Chemical measures</u> Limit treatment to afflicted zones Treatment starting at begin of vegetation period. Avoid bad drainage.	Copper Fosethyl Aluminium	A maximum of 2 applications per year against this disease
Fruit Rot (<i>Gloesporium album</i>)	<u>Chemical measures</u> Only pre-harvest treatments	Captan (1) Pyraclostrobin (2) + Boscalid (3) TMTD (4)	(1) A maximum of 3 applications per year independently of the disease, for varieties susceptible to russetting (see list) a maximum of 4 applications (2) A maximum of 3 applications with Strobilurine per year independently of the disease (3) A maximum of 3 applications per year independently of the disease (4) A maximum of 5 applications with Dithiocarbamates per year
Alternaria (<i>Alternaria spp.</i>)	<u>Chemical measures</u> Only pre-harvest treatments	Iprodion (1) Pyraclostrobin (2) + Boscalid (3) TMTD (4)	(1) A maximum of 2 applications per year independently of the disease for the varieties Gala, Golden Delicious e Cripps Pink a maximum of 3 applications per year (2) A maximum of 3 applications with Strobilurine per year independently of the disease (3) A maximum of 3 applications per year independently of the disease (4) A maximum of 5 applications with Dithiocarbamates per year
Remark: authorized SBI: Penconazol, Tetraconazol, Difenconazol, Myclobutanil.			
Remark: Varieties susceptibel to russetting: Golden Delicious, Pinova, Cripps Pink, Gala, Jonagold, Elstar, Granny Smith, Fuji, Braeburn, Winesap, Morgenduft; Stark Delicious if used as pollinator variety			

PEST	CRITERIA FOR INTERVENTION	ACTIVE INGREDIENT	REMARKS AND RESTRICTIONS
San José Scale (<i>Comstockaspis pernicios</i>)	Intervention level Presence If present, treatment at the end of winter when larvae emerge.	Lime sulphur Mineral oil Phosmet (1) (*) Chlorpyrifos-methyl (1)(*) Pyriproxyfen (2)	(1) Side-effect on may bug, garden chafer and apple clearwing moth (2) A maximum of 1 application per year independently of the pest, only in pre-blossom
Rosy Apple Aphid (<i>Dysaphis plantaginea</i>)	Intervention level Presence	Fluvalinate (1) Imidacloprid (2) Thiamethoxam (2) Acetamiprid (2) Clothianidin (2) Flonicamid (3) Azadirachtin Pirimicarb	(1) A maximum of 1 application per year independently of the pest (2) Among Acetamiprid, Thiamethoxam, Clothianidin and Imidacloprid a maximum of 1 application per year independently of the pest (3) A maximum of 1 application per year independently of the pest
Tortrix Moth (<i>Pandemis cerasana</i> , <i>Archips podanus</i> , <i>Adoxophyes orana</i> , <i>Pandemis heparana</i>)	Intervention level See notes of the local advisory board.	Bacillus thuringiensis Flufenoxuron (1) (**) Tebufenozid (**) Methoxyfenozid (**) Chlorpyrifos-methyl (2)(*) Spinosad (3) Indoxacarb (4) Chlorantraniliprole (5) Emamectin benzoat(6)	Internal pheromone traps or monitoring net (1) A maximum of 1 application per year independently of the pest, only until the end of May, use only products authorized for this purpose (2) Side-effect on may bug, garden chafer and apple clearwing moth (3) A maximum of 3 applications per year independently of the pest (4) Side-effect on winter moths and noctuids (5) A maximum of 2 applications per year independently of the pest (6) A maximum of 2 applications per year independently of the pest

PEST	CRITERIA FOR INTERVENTION	ACTIVE INGREDIENT	REMARKS AND RESTRICTIONS
Codling Moth (<i>Cydia pomonella</i>)	Give preference to disruption methods for treatment. Intervention level After checking at least 500 fruits per hectare, count the number of boreholes: June - 3 bored fruits/1.000 July - 5 bored fruits/1.000 August - 8 bored fruits/1.000	Mating disruption Granulose virus Diflubenzuron (**) Flufenoxuron (1) (**) Methoxyfenozid (**) Tebufenozid (**) Spinosad (2) Chlorpyrifos-ethyl (3)(*) Phosmet (3) (*) Thiacloprid (4) Chlorantraniliprole (5) Emamectin benzoat(6)	Internal pheromone traps or monitoring net (1) A maximum of 1 application per year independently of the pest, only until the end of May, use only products authorized for this purpose (2) A maximum of 3 applications per year independently of the pest (3) Side-effect on may bug, garden chafer and apple clearwing moth (4) A maximum of 1 application per year independently of the pest (5) A maximum of 2 applications per year independently of the pest (6) A maximum of 2 applications per year independently of the pest
Oriental Fruit Moth (<i>Cydia molesta</i>)	Intervention level Egg deposition or 1% boreholes upon checking at least 100 fruits/ha	Bacillus thuringiensis Mating disruption Methoxyfenozid (**) Spinosad (1) Chlorantraniliprole (2) Emamectin benzoat(3)	(1) A maximum of 3 applications per year independently of the pest (2) A maximum of 2 applications per year independently of the pest (3) A maximum of 2 applications per year independently of the pest
Leaf Miners (<i>Lithocolletis blancardella</i>) (<i>Leucoptera scitella</i>) (<i>Phyllonorycter corylifoliella</i>) (<i>Lyonetia clerkella</i>)	Intervention level See notes of the local advisory board.	Acetamiprid (1) Imidacloprid (1) Thiamethoxam (1) Spinosad (2) Fenoxycarb (3) Chlorantraniliprole (4) Emamectin benzoat(5)	(1) Among Acetamiprid, Thiamethoxam, Clothianidin and Imidacloprid a maximum of 1 application per year independently of the pest (2) A maximum of 3 applications per year independently of the pest (3) A maximum of 1 application per year independently of the pest (4) A maximum of 2 applications per year independently of the pest (5) A maximum of 2 applications per year independently of the pest

PEST	CRITERIA FOR INTERVENTION	ACTIVE INGREDIENT	REMARKS AND RESTRICTIONS
Red Spider Mite (<i>Panonychus ulmi</i>) Twospotted Spider Mite (<i>Tetranychus urticae</i>)	Intervention level See notes of the local advisory board.	Pyridaben Etoxazol Hexythiazox Tebufenpyrad Fenazaquin Milbemectin Abamectin (1) Mineralöl	Against these pests a maximum of 2 applications per year (1) A maximum of 1 application per year independently of the pest
Apple Rust Mite (<i>Aculus schlechtendali</i>)		Abamectin (1) Mineralöl Fenazaquin	(1) A maximum of 1 application per year independently of the pest
Greene Apple Aphid (<i>Aphis pomi</i>)		Pirimicarb Azadirachtin Thiamethoxam (1) Acetamiprid (1) Clothianidin (1) Flonicamid (2)	(1) Among Acetamiprid, Thiamethoxam, Clothianidin and Imidacloprid a maximum of 1 application per year independently of the pest (2) A maximum of 1 application per year independently of the pest
Woolly Apple Aphid (<i>Eriosoma lanigerum</i>)	Intervention level 10 living colonies on checking 100 afflicted organs Check presence of <i>A. mali</i> wasps which can effectively reduce infestation.	Thiametoxam (1) Acetamiprid (1) Imidacloprid (1) Clorpyriphos-ethyl (2) (*) Pirimicarb	(1) Among Acetamiprid, Thiamethoxam, Clothianidin and Imidacloprid a maximum of 1 application per year independently of the pest (2) Side-effect on may bug, garden chafer and apple clearwing moth
Psyllids (<i>Cacopsylla melanoneura</i>) (<i>Cacopsylla picta</i>)		Chlorpyriphos-ethyl (*) Etofenprox (1) Fluvalinate (2)	(1) A maximum of 1 application per year independently of the pest, only in pre-blossom Side effect on apple blossom weevil (2) Use of Fluvalinate during the blossom is subordinated to the obligatory pest control
May Bug (<i>Melolontha melolontha</i>)	Intervention level See notes of the local advisory Board, only in years of mass flight.	Acetamiprid	(1) A maximum of 1 further application per year in addition to the just provided Chloronicotinyles (only in pre-blossom)
Common voles and Water voles		Bromadiolon	

(*) Independently of the pest a maximum of 6 applications per year with: Chlorpyriphos-ethyl, Phosmet, Clorpyriphos-methyl

() Independently of the pest a maximum of 3 applications per year with: Methoxyfenozid, Tebufenozid, Diflubenzuron and Flufenoxuron (Methoxyfenozid: Side-effect on winter moths and noctuids)**

WEEDS	CRITERIA FOR INTERVENTION	ACTIVE INGREDIENTS	%	DOSAGE l/ha/YEAR
Grasses and dicotyledonian weeds	<u>Agronomic measures</u> Use of plant cover, mowing, mulching and/or ground tillage			Independently of the number of treatments per year are allowed:
	Not allowed: tillage of the alleys in orchards with irrigation			
	<u>Chemical measures</u> Chemical treatment of the alleys is not allowed.	Glyphosate	30,4	l/ha = 7,5
	Use in rows limited, use of low doses in the early developmental stages of the weeds.	MCPA	25	l/ha = 1,5
	Repeat treatments if necessary.	Oxadiazon (1)	34	l/ha = 4
	Fall treatments recommended.	Oxyfluorfen	22,9	l/ha = 1
	The use of herbicides can be meaningful if: - the distance in the row between individual trees is less than 1.5-2 m - the trees have root systems above ground (i.e. quince rootstocks and BA29 for pears - M9 and M26 for apples). - there is danger of erosion (i.e. gradient above 5%). - low branches and small plots do not allow for mechanical measures.	Carfentrazon ethyl	6,45	l/ha = 1
Weed control must be confined to the tree row.				
The treated area may not exceed 50% of the total area.				
(1) Only in the planting year allowed				

Active ingredient list for integrated pome production 2011

Insecticides

Active ingredient	Trade name	Waiting period (in days)	Remarks
Azadirachtin	Diractin, NeemAzal-T/S, Oikos 25	3	
<u>Chitin synthesis inhibitors + Moulting accelerating compounds:</u> Diflubenzuron	Dimilin, Dimilin 25 PB, Du-Dim 5 PB	45	A maximum of 3 applications with products from this group per year is allowed. A maximum of 1 application with Flufenoxuron per year is allowed, only until the end of May.
Flufenoxuron	Agrimix Flufen 50 DC, Colosseo	90	
Methoxyfenozid	Prodigy	14	
Tebufenozide	Confirm, Mimic	14	
Chlorantraniliprole	Coragen	14	A maximum of 2 applications per year is allowed.
<u>Chloronicotinyle:</u> Acetamiprid	Epik	14	A maximum of 1 application with products from this group per year is allowed. To control May bugs in years of mass flight 1 further application with Acetamiprid is allowed.
Clothianidin	Dantop 50 WG	14	
Imidacloprid	Confidor 200 SL, Confidor O-TEQ	28	
Thiamethoxam	Actara 25 WG	14	
Emamectin benzoat	Affirm	7	A maximum of 2 applications per year is allowed.
Etofenprox	Trebon up	7	A maximum of 1 application per year is allowed, only in pre-blossom
Fenoxycarb	Insegar	30	A maximum of 1 application per year is allowed.
Fonicamid	Tepeki	21	A maximum of 1 application per year is allowed.
Fluvalinate	Klartan 20 EW, Mavrik 20 EW	End of blossom	A maximum of 1 application per year is allowed.
Indoxacarb	Steward	7	A maximum of 4 applications per year is allowed.
Mineral oil	Albene, Biancolio E, Biolid E., Chemol, Coccitox fluido, Eko Oil Spray, Oliocin, Ovipron Top, Ovispray, Presidium, Primoil ES, Sipcamol E, Vernoil	20	
<u>Organophosphorus:</u> Chlorpyrifos-ethyl	Alisè WG, Dursban 75 WG, Pyrinex ME	30	A maximum of 6 applications with products from this group per year is allowed.

Chlorpyrifos-methyl	Etifos ME, Reldan 22	15	
Phosmet	Faster WDG, Imidan 23,5 WDG, Spada WDG, Suprafos WG	21	
Pirimicarb	Aphox, Pirimor 17,5	14	
Pyriproxyfen	Admiral 10 EC, Juvinal 10 EC	Start of blossom	A maximum of 1 application per year is allowed, only in pre- blossom
Spinosad	Laser, Success	7	A maximum of 3 applications per year is allowed.
Thiacloprid	Calypso	14	A maximum of 1 application per year is allowed, not against the 1 st generation of codling moth.

Regulations concerning the protection of bees

Protection of bees is not indispensable only during blossoming, but throughout the whole year. All treatments are to be effected in a way that there is no danger to these insects. Prior to using products harmful to bees, the orchard must be mulched.

The period proclaimed by the department of horticulture and viticulture in which no substances dangerous to bees may be applied must be complied with.

Independent from this period, no substances dangerous to bees may be applied as soon as the first blossoms open and until the trees are completely finished blossoming. The start of blossoming recorded in the orchard register is binding; the use of substances dangerous to bees on blossoming fruit trees after this date as well as use during the period determined by the authorities will be punished.

Plant protection products harmful to bees:

Plant protection products allowed in the AGRIOS program are classified as harmful to bees when they contain one or more of the following active ingredients:

Abamectine
Cloranthraniliprol
Chlorpyrifos-Ethyl
Chlorpyrifos-Methyl
Clothianidin
Emamectin benzoat

Etofenprox
Fenoxycarb
Flufenoxuron
Imidacloprid
Milbemectin

Phosmet
Pyridaben
Spinosad
Teflubenzuron
Thiamethoxam

Biological and biotechnical measures

Active ingredient	Trade name	Waiting period (in days)	Remarks
Bacillus thuringiensis	Biobit DF, CoStar WG, Delfin, DiPel DF	3	
Granulose virus	Carpovirusine Plus, CYD-X, Madex	3	
Mating disruption	Ecodian CP, Isomate C/OFM, Isomate C-Plus, Isomate CTT, Isomate OFM Rosso, Rak 3	-	

	Poltiglia 20 PB Manica, Polvere Caffaro New, Ramin 30 DF, S. Ramedit Blu WG, S. Ramedit New, Selecta Disperss, Siaram 20 GD, Tri-Base, Tribasic-DEL, Zetaram 20 L, Zetaram New Tech	40 Start of blossom Start of blossom Start of blossom Start of blossom 7 Start of blossom Start of blossom Start of blossom 28 Start of blossom	
Dithianon	Agrition 66 DF, Delan 70 WG, Gladior WDG, Grado 66 WG, Kuki WG, Minosse WG, Steady, Thian, Tianon WG	21	
<u>Dithiocarbamate:</u> Mancozeb	Agrizeb DG, Critttox MZ 80, Dithane M-45, Dithane DG Neotec, M 70 DF, Penncozeb DG	28	A maximum of 5 applications with dithiocarbamate per year is allowed.
Metiram TMTD	Polyram DF Pomarsol 80 WG, Silfur GD 50, TMTD 50 SC	28 35	
Dodine	Comet SC, Dodina 65 WG, Fulldina 35 FL, Guanidol 65, Guanidol WDG, Syllit 65 WG, Venturex 35 L	10	
Fluazinam	Banjo, Ohayo	60	A maximum of 3 applications per year is allowed.
Fosetyl-Aluminium	Aliette, Jupiter WG, Kelly WP, Optix WG	40	
Iprodion	Rovral, Rovral FL	21	A maximum of 2 applications per year is allowed. For the varieties Gala, Golden Delicious and Cripps Pink a maximum of 3 applications per year is allowed.
Quinoxifen	Arius	14	A maximum of 3 applications per year is allowed.
<u>Sterol biosynthesis inhibitors:</u> Difenoconazol	Plover, Score 25 EC	14	A maximum of 6 applications with sterol biosynthesis inhibitors per year is allowed.
Myclobutanil	Duokar 4,5 EW Pro, Systhane 4,5 Plus, Thiocur Forte	15	
Penconazol	Noidio Gold, Noidio Gold 10 EC,	14	

Tetraconazol	Rogas 10 EC, Scudex, Scudex WDG, Topas 10 EC, Topas 10 WDG, Topas 200 EW Concorde 125, Domark 125, Emerald 125	14	applications per year is allowed.
<u>Strobilurine:</u> Boscalid + Pyraclostrobin	Bellis	7	A maximum of 3 applications with Strobilurine a year is allowed.
Trifloxystrobin	Flint	14	
Sulfur	Cosan S, Crittovit WG, Kumulus Tecno, Sulfur 80, Tiovit Jet	5	

Herbicides

Active ingredient	Trade name	AGRIOS waiting period (in days)	Remarks
Carfentrazon ethyl	Spotloght plus	7	A maximum of 1 l/ha/year
Glyphosate	Buggy, Glifene SL, Glyphogan Top MK, Roundup Bioflow, Solado Gold, Touchdown	-	A maximum of 7,5 l/ha/year
MCPA	Erbitox E 30, Fenoxilene MAX	80	A maximum of 1,5 l/ha/year
Oxadiazon	Ronstar FL	-	A maximum of 4 l/ha/year, only in planting year
Oxyfluorfen	Goal 480 SC	-	A maximum of 1 l/ha/year

Rodenticides

Active ingredient	Trade name	AGRIOS waiting period (in days)	Remarks
Bromadiolon	Agrirat	-	

Acaricides

Active ingredient	Trade name	AGRIOS waiting period (in days)	Remarks
Abamectine	Vertimec EC	28	A maximum of 1 application per year is allowed.
Etoxazol	Borneo, Swing	28	A maximum of 1 application per year is allowed.
Fenazaquin	Magister 100 EC, Magister 200 SC	28	A maximum of 2 applications per year against spider mites is allowed.

Hexythiazox	Matacar FL	14
Milbemectin	Milbeknock	14
Pyridaben	Nexter	14
Tebufenpyrad	Oscar	28

Remarks:

The use of plant protection products which harm beneficial insects such as Dithiocarbamate negatively affect the population dynamics and distribution of predatory mites. As a result of their use, treatments against harmful mites are then necessary. Products which disturb beneficial insects should be used carefully and to a limited extent.

Limited use of acaricides reserves their best effects for those cases where an acaricide treatment becomes necessary.

Other products

Active ingredient	Trade name	AGRIOS waiting period (in days)	Remarks
Alpha-naphtyl-acetamid (NAD)	Amid Thin W, Diramid, Geramid Neu	30	
Alpha-naphtyl acetic acid	Dirado, Dirager, Hergon L, Nokad, Obsthormon 24a, Regolator	- 7 7 7 7 7	
6-Benziladenin	Brancher-Dirado, Exilis, GerBa 4 LG, GerBathin 2 LG, MaxCel	-	
6-Benziladenin + Gibberellin A4 +A7	Agrimix PRO, Perlan, Profile, Promalin NT	-	Only apples
Ethephon	Ethrel	14	Allowed until June 15 th (only apples)
Gibberellin A4 +A7	Agrimix GOLD, Nectar, Novagib, Regulex	- - - 20	Only apples
1-MCP	SmartFresh	-	Only 1 application per lot is allowed, it should not be used for the variety Braeburn
Prohexadion-Ca	Regalis	55	