



Principles & Practices for the Sustainable Production of Arable & Vegetable Crops

SAI Platform Arable & Vegetable Crops Working Group





Principles and Practices for Sustainable Production of Arable & Vegetable Crops (version 2009)

Producers aim to ensure that the safety and quality of their products will satisfy the highest expectations of the food industry and consumers. In addition, on-farm practices should ensure that arable and vegetable crops are produced under sustainable economic, social and environmental conditions.

To that aim, **this document provides a set of principles and practices for sustainable production of arable and vegetable crops for the mainstream market in all regions of the world. This document is meant to be revised regularly on the basis of practical experience. It is also meant to be completed with specific guidelines and practical tools based on local innovations and adapted to local prevailing conditions (according to the region and its climates, ecological variables, farming systems, cultures etc) as well as respecting national laws and regulations.**

The **Basic framework** looks as follows:

1. **Item.** An item refers to an *object of management*.
2. **Principles** *identify the objective(s) of what should be accomplished* with regard to an item.
3. **Recommended Practices** provide a *set of identified non-exclusive tools and measures* that can be implemented to achieve the objective(s) of a principle.

It is important to note that good management of a farming system constitutes the grassroots of the system's economic, environmental and social sustainability. Therefore, it first pays attention to planning and managing well the overall farm system itself. This document's scope of management action is limited to what farmers or groups of farmers themselves can achieve.

Farmers shall have taken into consideration applying the principles and practices to the whole farm system within a philosophy of continuous improvement, starting with the crop or livestock in scope. The following headings and bullets summarise the sections and objectives when applied to a whole farm system. The individual sections in the document contain greater detail of practices.

Sustainable Farming Systems (chapter 1)

- Are varieties suited to the local climate, soil, pests & diseases being grown?
- Nutrients – how is crop nutrition calculated? How are nutrients stored considering environmental/safety risks?
- Pest management – Are all key pests known? Is IPM applied? Are pesticides stored safely & securely?

Economic sustainability (chapter 2)

- Is yield increase possible? Is food safety and food quality understood? Is the farm system diverse enough? Is there access to market information? Is group use of equipment or group purchasing an option?

Social Sustainability (chapter 3)

- Social & Human capital – including farm workers – Are workers treated fairly? Is training a priority?
- Local community /economy - Is there a positive impact in the local community from the farm system?

Environmental sustainability (chapter 4)

- Soil fertility/soil loss – how is soil fertility maintained, is soil erosion an issue?
- Water – Is total water use for irrigation known? How is irrigation amount calculated? Is the water source for irrigation sustainable? Are the impacts of fertilisers and pesticides considered?
- Biodiversity – Are there natural habitats on farm? Are rare species of plant/animal threatened by growing the crop?
- Energy – Are the major energy inputs known? How can their impact on climate change be reduced?
- Waste – Are the principles reduce, reuse, recycle, dispose understood? Are pesticides/fertilisers disposed of safely?

1. Sustainable Farming System

Item	Principles	Recommended Practices
1.1 Site selection and management	SF1. When planning and managing the farm activities, be aware of the site history (previous land use).	<p>A risk assessment shall be undertaken for new production sites considering the following:</p> <ul style="list-style-type: none"> ▪ Taking into account the prior use of land e.g. historical/archaeological remains, any soil pollution issues or land change from forest to agricultural land, availability and quality of water resources, pest disease and weed levels and the potential impact of the production on adjacent crops and the adjacent area. ▪ Sites should be checked against any off site contaminant (e.g. invasive species) or pollution risk and protected against those through adequate buffer zones when necessary.
1.1 Site selection and management	SF2. When planning and managing the farm activities, properly take into account the site specificities (such as topography, neighboring activities, ecological and social conditions).	<p>A risk assessment shall be undertaken for on site/off-site impacts considering the following:</p> <ul style="list-style-type: none"> ▪ Soil erosion (storm events or dust from cultivation), water pollution (soil, from storing or applying nutrients, or pesticides or storage of fuel or waste storage/disposal), pesticide drift, natural habitat destruction, archaeological sites, tourist sites, hunting/poisoning or rare/endangered species, worker welfare, health & safety at work, food safety.
1.2 Sustainability management system	SF3. Maintain a functioning sustainability system on the farm, geared towards continuous improvement.	<p>Records (Records belong to the farmers and shall only be disclosed with their approval.)</p> <ul style="list-style-type: none"> ▪ Reliable information on the following shall be recorded: <ul style="list-style-type: none"> - Yield - Varieties grown - Fertilisers applied, pesticides applied, irrigation applied - Gross Margin (if feasible) - Soil analysis ▪ Reliable information on the following should be recorded: <ul style="list-style-type: none"> - Biodiversity - Techniques used - Energy use <p>Reviewing results</p> <ul style="list-style-type: none"> ▪ Existing records and practices shall be examined critically by the farmer in order to improve the overall sustainability of the farm. ▪ The farmer shall ensure that the all people working on the farm are aware of the relevance of their

		specific responsibilities and contribution to the economic, social and environmental sustainability of the farm. (see also 3.3 Training).
1.2 Sustainability management system	SF4. Record reliable information on farm inputs and techniques used on the farm.	<ul style="list-style-type: none"> ▪ Reliable information on the following shall be recorded: <ul style="list-style-type: none"> - Varieties grown - Fertilisers applied, pesticides applied, irrigation applied - Soil analysis - Techniques used - Energy use
1.2 Sustainability management system	SF5. Take the opportunity of accessing valuable information and support services to continuously improve the farm overall sustainability.	<ul style="list-style-type: none"> ▪ Regular advice shall be sought by farmers on a variety of issues, including: <ul style="list-style-type: none"> - How to get access to improved arable and vegetable production technologies, tools and best practices - How to access and use instruments and tools (e.g. financial planning) for improved financial management - Information about the market, sales and production of the product in order to better meet market requirements, and tools to optimise his/her economic return. ▪ When sought, advice and information should be taken from reliable sources, e.g. qualified agronomists, training courses, farming magazines, and/or suitable internet sites.
1.3 Planting material	SF6. Consider the farm's structure & local situation when choosing planting material.	<p>Variety choice and use shall consider the following:</p> <ul style="list-style-type: none"> ▪ Resistance or tolerance to commercially important pests and diseases, adapted to local conditions and meet customers specified requirements ▪ Growing of any genetically modified plants for consumption must comply with all the regulations in place for both countries of production and consumption, and checked if they are accepted by direct customers and consumers.. ▪ Varieties are planted at the optimal time of the season. ▪ Invasive species should not be planted ▪ Seed/Tubers/bulbs are true to type and the quality is checked before use and is traceable to source. ▪ Records are kept of the variety name, batch number and seed vendor.
1.4 Integrated crop management	SF7. Use rotation practices for annual crops as an important tool of integrated crop management and as a diversified source of income for the farm.	<ul style="list-style-type: none"> ▪ Rotation of crops shall be considered. ▪ Whether rotation is or is not possible farmers shall record on a regular basis suitable indicators of soil health these could be for example: stable or increasing yield, stable or reducing fertiliser/pesticide inputs, stable or increasing organic matter levels, stable soil nutrient levels. ▪ The planning of the crop shall take into account the previous crops protection against pests and diseases ▪ Farmers should use diverse crop rotations and seek to employ these whenever possible to maintain soil

		condition, minimise risk of nitrate leaching and reduce pest and disease development to maximise plant health as well as to spread the farm income streams
1.4 Integrated crop management	SF8. Use specific cultivation techniques to maintain or improve the physical and biological characteristics of the soil as well as to reduce mineralization and leaching of nutrients.	<ul style="list-style-type: none"> If soil conditions allow, chopping and incorporation of crop residues as well as organic manure or compost shall be used to help improve soil fertility by increasing organic matter content, improving nutrient and water retention and reducing erosion.
1.4 Integrated crop management	SF9. Balance fertilization in order to provide the appropriate allowance of nutrients to the crops, taking into account release from other sources such as organic manures, soil organic matter etc.	<p>A cropping/nutrient management plan should consider the following:</p> <ul style="list-style-type: none"> The nutritional requirements of the crop to deliver the quality and yield for customer requirement. Soil types mapped for the farm so as to be used to plan nutrient requirements for rotations. Soil chemical, biological composition analysis – to ensure nutrient availability is understood as effected by pH, organic matter or clay/sand content. Application rates of either mineral or organic fertilisers applied in accordance with national and local legislation (e.g. nitrate sensitive areas) and meet the needs of the crop as well as maintaining soil fertility. Rates based on a calculation of the nutrient requirements of the crop and on regular analysis of nutrient levels in soil, plant or nutrient solution. A simple nutrient input/output balance using best available information, considering nutrient inputs, crop returned to the soil and crop off-take with the harvested part of the crop. Planting of catch crops to capture nitrates.
1.4 Integrated crop management	SF10. Avoid using sludge. If sludge is used though, manage it very carefully on the basis of proper risk assessment.	<ul style="list-style-type: none"> Untreated sewage sludge shall not be applied to land used to grow crops. Any use of treated sewage sludge on land destined for agricultural use shall be very carefully managed in accordance with national and local legislation. Farmers shall check whether their customers allow the use of treated sewage sludge.
1.4 Integrated crop management	SF11. Protect crops against pest, diseases and weeds with as little as possible reliance on pesticides. In particular, strive to use Integrated Pest Management (IPM) systems.	<p>The IPM system shall consider the following:</p> <ul style="list-style-type: none"> Responsibilities are clearly assigned for planning and carrying out pest control. Choice of crop/variety appropriate for the location as well as disease and pest resistance Use of cultural and physical controls: crop rotations (e.g. mechanical weeding), biological controls (e.g. beneficial insects) Regular visual inspections, thresholds or other recognised prediction systems to be used to avoid unnecessary application of pesticides. Use of selective pesticides (insecticides, fungicides, herbicides) rather than broad spectrum e.g. insecticides that only control the pest species, not the predators.

		<ul style="list-style-type: none"> ▪ Rotation of pesticide active ingredients to reduce resistance. ▪ Use of engineering/application techniques e.g. seed dressings, to improve targeting of pesticide application. ▪ Potential yield and quality loss must be assessed in determining treatment levels. Management tools (e.g. weather forecasts, crop stress) to be used before treatment to assess the risk.
<p>1.4 Integrated crop management</p>	<p>SF12. Chose, handle and store agricultural inputs with great precaution as per label instructions.</p>	<p>Pesticides shall be used as follows:</p> <ul style="list-style-type: none"> ▪ The crop protection product utilized is appropriate for the target pest and nationally registered in the country of use. ▪ Only using treatments legally approved in country of production, which also comply with destination country maximum residue level (MRL) legislation. ▪ Use must not exceed maximum authorized doses, comply to label recommendations and must conform to pre-harvest intervals. ▪ Effective instructions are provided and measures taken, including use of appropriate equipment (e.g. Personal protective Equipment (PPE)), to protect health and safety of farm workers who handle or are exposed to agrochemicals. Instructions should highlight the legal aspects, use, storage, environmental and safety aspects and other precautions. ▪ Spray equipment must be maintained and calibrated on a regular basis. ▪ Surplus spray mix and washings must be disposed of according to local legislation and prevent surface and groundwater contamination. ▪ Non target areas should be protected with appropriate measures (e.g. buffer strips). <p>Pesticide Storage</p> <p>Crop protection products shall be stored safely and securely considering the following:</p> <ul style="list-style-type: none"> ▪ Pesticide containers shall be disposed off properly and not be reused. Ideally, they shall be punched and taken off the farm by official companies or burned at high temperatures with secure and proven techniques. ▪ Storage facilities must be constructed of suitable materials, well ventilated, well lit and located where risks to the environment or human health are minimised in case of fire, spillage, flooding or other emergencies. ▪ Separate storage from living quarters, food, feed, fertiliser, fuel and waste. ▪ Areas where pesticides are handled and stored are designed such that spillages can be contained and do not reach the environment or pose a risk to human health. ▪ Pesticide contaminated equipment (e.g. sprayers, PPE, measuring equipment) is stored and handled as specified by the manufacturer, separately from food, feed, living quarters and food preparation and consumption areas). ▪ A record kept of pesticides currently in the store.

	<p>Fertilizers shall be used as follows:</p> <ul style="list-style-type: none"> ▪ Fertilizers are only applied to the intended crop area, non crop areas should be protected with appropriate measures (e.g. buffer strips) ▪ Procedures are in place to deal with accidents and spillages. ▪ Measures to avoid nitrogen and phosphate being lost to the environment, e.g. avoid rainy periods, avoid frozen, cracked, water logged, compacted soils, or the application technique such as split applications, incorporation or direct injection. ▪ Application equipment is maintained and calibrated on a regular basis. ▪ All fertiliser should be recorded and records should include: crop name, location of application, date of application, product trade name, operator name, and product quantity. <p>Fertiliser Storage</p> <p>Fertilisers shall be stored safely and securely considering the following:</p> <ul style="list-style-type: none"> ▪ Storage and all products stored must comply with national and local legislation. ▪ Storage facilities must be constructed of suitable materials (e.g. liquid fertilisers have different storage requirements to solids) and located where risks to the environment or human health are minimised, in case of fire, spillage, flooding or other emergencies. ▪ Fertilisers must not be stored with pesticides or fuel. ▪ A record kept of fertilisers currently in store. <p>Fuel Storage</p> <p>Fuels shall be stored safely and securely considering the following:</p> <ul style="list-style-type: none"> ▪ Storage facilities are constructed of suitable materials and located where risks to the environment or human health are minimised, in case of fire, spillage, flooding or other emergencies. ▪ Fuel must not be stored with pesticides and fertilisers.
--	---

2. Economic Sustainability

Item	Principles	Recommended Practices
2.1 Safety, quality and transparency	EC1. Ensure the safety, quality and transparency of the products throughout the production methods and storage facilities.	<p>Food Safety & Quality</p> <p>Farmers shall ensure they understand their role and responsibilities for ensuring food safety and quality and are familiar with the principles of Hazard Analysis and Critical Control Points (HACCP). Typical (but not exhaustive) crop Safety and Quality Hazards are listed:</p> <p>Biological</p>

		<ul style="list-style-type: none"> ▪ Pathogenic bacteria e.g. <u>E.coli</u>, <u>Salmonella</u>, Fungal toxins, Plant toxins – e.g. glycoalkaloids from solanaceous weeds ▪ Fungal bodies or plant berries e.g. ergot, nightshade ▪ GMO modified material ▪ Fungal moulds and bacterial rots (spoilage) ▪ Plant diseases ▪ Insects ▪ Animal or Human matter – e.g. faeces (e.g. temporary post harvest storage contamination from birds/rodents) <p>Chemical</p> <ul style="list-style-type: none"> ▪ Pesticide residues – e.g. exceeding MRLs, or using pesticides not permitted in origin or destination country. ▪ Nitrate levels – certain leafy crops such as spinach ▪ Heavy metal levels e.g. Pb, Cd ▪ Mineral oils – lubricants, hydraulic oil, diesel ▪ Composition – e.g. protein, sugars, oil ▪ Dry matter content <p>Physical</p> <ul style="list-style-type: none"> ▪ Glass, Metal, Stones, Wood ▪ Extraneous vegetable matter (EVM) – contamination with other plant parts ▪ Foreign EVM – contamination with plant parts not from the crop ▪ Physical damage and blemishes ▪ Size/shape ▪ Colour ▪ Soil contamination <p>Farmers should put in place a HACCP system, by mapping out the crop production process on farm to ex farm, once crop Safety and Quality Hazards have been identified. The management system then defines limits for the hazard, monitoring processes and remedial actions to reduce the risk of the Hazard to acceptable on farm levels.</p> <p>Traceability</p> <ul style="list-style-type: none"> ▪ The farmer shall consult with the customer as to the level of traceability and chain of custody required. (For example: This may be to the field, farm, farm store or co-operative level.)
<p>2.2 Financial stability</p>	<p>EC2. Seek to achieve long-term stability of the farm income for proper investments and</p>	<p>The farm’s forward business plan shall take in to consideration the following:</p> <ul style="list-style-type: none"> ▪ market characteristics ▪ how diverse are the income streams (i.e. heavily reliant on one crop, or balanced over a number) ▪ customer demand (What are customers plans? Are there different ways of working together?)

	workforce payment.	<ul style="list-style-type: none"> ▪ optimal yields ▪ profit (gross margin calculations understanding variable costs) ▪ current capabilities and resources (land, skills, workforce) ▪ investments necessary for continuous improvement plan/change management ▪ fixed overhead costs (labour, machinery depreciation, land rent, energy, maintenance)
2.3 Market	EC3. Seek to get organised and to select efficient trading channels in order to optimize benefits.	<ul style="list-style-type: none"> ▪ Farmers shall negotiate in open and honest terms with their customers (optimum in quantity and quality), and try to develop long-term trading relationships with them. ▪ Farmers may consider getting organised in groups, to better access support services and improve the position in bargaining prices for crop inputs (e.g. seed, fertilisers, fuel, pesticides, machinery, technical advice) ▪ Farmers shall liaise with customers on the optimum timing of harvesting/crop deliveries to ensure efficient trading channels and the best price for and share of the product value. ▪ Farmers should actively seek feedback from direct customers on how to increase 'value' for each other.
2.4 Diversification	EC4. Seek to diversify the farm into other farming activities or/and possible non-farming activities if appropriate, in order to increase farm income and to reduce risk linked to market price fluctuations.	<ul style="list-style-type: none"> ▪ Farmers shall assess the diversity of sources of income considering the following: ▪ Is income dominated by one crop ▪ Are there alternative crops would could be grown on the farm, either for on-farm consumption or to be sold externally ▪ Is development of non-farming activities feasible. ▪ Are customers a source of innovation?

3. Social Sustainability

It is recognized that the majority of the farms are family run and family labour helping on the farm is often an essential component for the sustainability of the farm. In these circumstances, some of the principles might not fully apply. In any case, farms should comply with their national labour legislation, and if none exists, refer to the ILO conventions.

Item	Principles	Recommended Practices
3.1 Working conditions	SOC1. Provide a cordial and pleasant working environment, free of any type of discrimination ¹ and free of disciplinary practices ² .	<ul style="list-style-type: none"> ▪ Discrimination on the basis of ethnic groups, national origin, religion, disability, gender, sexual orientation, worker organisations or political affiliation with regard to contracts, compensation, training, promotion, dismissal or retirement of its personnel should be strictly prevented. ▪ Same rights and obligations should be conceded to women and men. consistent with in-country cultural practices and balanced with international Convention ▪ Employees and workers should not be asked to leave deposits or identity cards behind. ▪ Employees and workers should have the right to freely practice their religion or fulfil their needs relating to race, national origin, religion, disability, gender, sexual orientation, membership in worker organisations or political affiliation. ▪ Decent working conditions and dignity should be provided to all workers regardless of their employment status. ▪ Behaviour, including gestures, language, and physical contact that is of a sexually abusive, coercive and threatening nature must be prevented.
3.1 Working conditions	SOC2. Farm workers and their families (if applicable) have access to suitable sanitary, housing and transportation infrastructures and services.	<ul style="list-style-type: none"> ▪ Workers and their families should be provided with suitable sanitary facilities and drinking water in sufficient amounts ▪ Workers and their families, living on the farm, should have access to medical treatment, nutrition and accommodation ▪ Suitable and hygienic facilities should be provided for the preparation, storage and consumption
3.1 Working conditions	SOC3. Provide recognised employment relationship to workers based on national law and	<ul style="list-style-type: none"> ▪ Workers should be encouraged to know their status and, consequently, their respective rights and obligations under law. ▪ Working contracts or other appropriate working relationships should be established, in accordance with national law.

¹ as per ILO Convention 111 on Discrimination and ILO Convention 100 on Equal Remuneration

² as per the Universal Declaration of Human Rights

	practice.	<ul style="list-style-type: none"> Temporary workers should be managed in a way that is as close as possible with those applied to permanent employees.
3.1 Working conditions	SOC4. Ensure that workers' working hours comply with national and local laws. Overtime performed during peak season is acceptable but duly compensated.	<ul style="list-style-type: none"> Daily working hours for registered employees should not exceed the maximum number of hours set by national regulations. Registered employees should be conceded for every six working days at least one day of rest, covered by their salary. Overtime work shall be demanded only in exceptional circumstances over a short-term period due to the business cycle, notably during the harvest season. Overtime should be compensated adequately. Registered employees who have worked at the farm for more than one year should have a period of paid leave (in line with local law and conventions).
3.1 Working conditions	SOC5. Ensure that wages and benefits received by workers comply as a minimum with local and national legislation.	<ul style="list-style-type: none"> Wages and benefits of permanent employees should meet or exceed the minimum required under local and national laws. Workers, especially temporary ones, should be provided with clear information about the payment that they receive for their work. All employees and workers should receive remuneration in accordance with their tasks and abilities while having equal work opportunities. Employees and workers should be able to receive wages in legal tender/ currency. Compensation with merchandise, vouchers, tokens or any other symbolic means may be agreed upon with the employee or worker without creating any form of dependency. Deductions should not be made from wages for disciplinary purposes
3.1 Working conditions	SOC6. Ensure that working conditions comply with applicable laws as well as international Conventions and Recommendations related to occupational health and safety ³ .	<ul style="list-style-type: none"> Actions should be promoted on the farm, which help prevent accidents and injuries of farm employees and workers during their duties. This equally refers to accidents and injuries of farm employees and workers as well as their families when living on the farm. Access should be guaranteed to hygienic bathrooms and potable water for all employees and workers. Activities should be promoted for the prevention of diseases, like vaccination, orientation in aspects of personal hygiene.
3.1 Working conditions	SOC7. Do not use any form of forced labour ⁴ .	<ul style="list-style-type: none"> Forced labour of any type must neither be used nor supported.
3.1 Working conditions	SOC8. Allow workers to form and join unions of their choice and to bargain collectively ⁵ .	<ul style="list-style-type: none"> Employees and (family) workers should have the right to form and join associations of their own choice without previous authorisation. Employees and workers should be entitled to collective bargaining.

³ as per the ILO Encyclopaedia on Health and Safety

⁴ as per ILO Convention 29 on forced labour and ILO Convention 105 on the abolition of forced

⁵ as per ILO Convention 87 on Freedom of Association and Protection of the Right to Organize and ILO Convention 98 on the Right to Organize and Collective Bargaining

		<ul style="list-style-type: none"> ▪ Labour organisations should be allowed to conduct their activities if employees and workers wish so. ▪ Workers’ representatives should not be discriminated against.
3.1 Working conditions	SOC9. Do not use child labour ⁶ .	<ul style="list-style-type: none"> ▪ Child labour shall neither be used nor supported. ▪ For cultural and socio-economic reasons, children under the minimum working age referred by national laws are allowed to help their parents with crop production. It shall be ensured that they are not forced to work, do not work long hours and are not exposed to hazardous or heavy work. ▪ The individual situation of the children involved should be considered in relation to all actions implemented in order to eliminate child labour. All measures taken shall be designed to actually improve the living conditions of the individual child. ▪ Young workers under the age of 18 should not be exposed to situations in the workplace that are hazardous, unsafe or unhealthy, even more so than any other workers.
3.1 Working conditions	SOC10. Seek to assure children access to adequate education as well as to support the education of farm employees and workers.	<ul style="list-style-type: none"> ▪ Children below the work minimum age referred by national laws, living permanently or temporarily on the farm, should participate in educational programmes comparable with the formal school system. ▪ Education programmes for workers’ children who are at school age should be promoted.
3.2 Training	SOC11. Support the training of farm employees and workers on all aspects of sustainable agricultural practices.	<ul style="list-style-type: none"> ▪ Make sure all people are sufficiently trained to carry out their tasks and their responsibility shall be well determined. ▪ Choose competent sources for advice and interventions. ▪ Knowledge and awareness of charters for good agricultural practice and guidelines should be promoted.
3.3 Local economy	SOC12. Contribute to provide economic benefits to local communities.	<ul style="list-style-type: none"> ▪ Farmers should consider the following: ▪ Being active members in their community e.g. engaging and consulting with schools, churches, local government. Understanding the community’s needs and therefore the mutual benefits between the farm business and the local community. ▪ Farmers should look to collaborate with the local community on aspects of improving environmental protection, health and safety linked to farm business impacts on the local community. ▪ Preference given to local communities with regard to recruitment of permanent and temporary personnel, thus contributing to the build-up of sustainable livelihoods.

⁶ as per ILO Convention 138 and its accompanying Recommendation 146 on Child Labour as well as ILO Convention 182 and its accompanying Convention 190 on the worst forms of child labour

4. Environmental Sustainability

Item	Principles	Recommended Practices
4.1 Soil	ENV1. Maintain good soil fertility and prevent damage to the environment, soil erosion and pollution.	<p>Cultivation methods and equipment shall consider the following:</p> <ul style="list-style-type: none"> ▪ Soil type ▪ Cultivation is timed to match soil conditions, i.e. should be avoided when soil is wet ▪ Farmers avoid cultivation of steeply sloping fields , follow contours with operations for soil preparation as much as possible or use terracing ▪ All cultivation equipment is regularly checked and maintained, including tyre pressures. ▪ Appropriate methods, e.g. planting hedges, using cover crops is used to maintain soil in steep areas ▪ Minimal cultivation techniques - is considered to reduce compaction and loss of soil organic matter. For those soil types where minimal cultivation techniques are not appropriate or where tenacious weeds occur, some rotational ploughing may be necessary.
4.2 Water	ENV2. Properly manage and optimise water use.	<p>The Farm enterprise activities shall not knowingly deplete available water resources, beyond the recharge capacity of the watershed/catchment, by direct abstraction and consider the following:</p> <ul style="list-style-type: none"> ▪ An assessment of the hydrologic characteristics of the soil should be performed before adopting any irrigation system. Overall, soil water is managed by drainage maintenance in wet climates and by soil moisture conservation practices, e.g. rainwater harvesting, mulching, in dry conditions. ▪ Water harvesting in balance with all catchment users requirements should be promoted. ▪ Advice on abstraction should be sought from water authorities or a relevant consultant. Water extraction licences, where held, are complied with. <p>An irrigation management system shall be used to ensure that:</p> <ul style="list-style-type: none"> ▪ Irrigation is only used when it can enhance the yield and quality of crops produced. ▪ Timing and amount of irrigation is tailored to crop requirements. ▪ Irrigation takes into account predicted rainfall and evaporation, using either daily rainfall records or weather forecasts to plan irrigation schedules) ▪ The most efficient and commercially practical water delivery system is used. In addition, water saving practices should be adopted and water should be re-used or re-cycled where possible. ▪ Irrigation water quality is monitored and managed where necessary ▪ Irrigation water usage records are maintained.
4.2 Water	ENV3. Properly manage the use of inputs and release of	<p>The Farm enterprise activities shall protect surface and ground water from direct and indirect pollution considering the following:</p> <ul style="list-style-type: none"> ▪ Untreated sewage water shall not be used for irrigation

	wastewater in surrounding water sources.	<ul style="list-style-type: none"> ▪ Sources of water are carefully and regularly assessed for their microbial, chemical and mineral content, and properly managed in accordance with the assessment results. ▪ The use of inputs as well as release of wastewater is properly managed in order to preserve surrounding water sources ▪ Manures and fertilisers are stored in a clean, dry location (preferably under cover), where there is no risk of contamination of watercourses, and separate from nursery stock; they are not be applied to water logged, steep or frozen ground where there is a risk of run-off. ▪ Buffer zones adjacent to waterways are planted, maintained or restored, preferably with native species.
4.3 Biodiversity	ENV4. Maintain or enhance biological diversity on the farm.	<p>Farmers are encouraged to have a biodiversity action plan for their farm which includes:</p> <ul style="list-style-type: none"> ▪ A map of the location of areas or features important to biodiversity on and around the farm ▪ An assessment of any particular biodiversity issues on and around the farm ▪ Details of how provision is made for wildlife habitats and food sources through hedges, field margins, extensive pasture, etc. ▪ Details of measures to protect important biodiversity features or areas ▪ A practical plan to make progress in an area of conservation/protection/education ▪ A periodic review to assess biodiversity improvements <p>The biodiversity action plan should also consider the following for guidance:</p> <ul style="list-style-type: none"> ▪ The farm environment is enhanced for locally important, rare or endangered species by providing appropriate habitats and adopting appropriate cultural practices, and reducing the negative impact of operations such as using agrochemicals, ploughing, grass cutting and hedge cutting. ▪ Areas of higher ecological value located on the farm are protected via the minimisation of human intervention and the implementation of measures for the conservation of biodiversity, soil, water, flora and fauna. In particular, field margins and buffer zones is maintained and dominated by native species. ▪ Restoration of vegetation is encouraged in degraded areas that have been prone to loss of fertility or soil erosion, preferably by using native species. ▪ Farmers are also encouraged to create biodiversity habitats, e.g. field margins or beetle banks, that may encourage natural enemies of pests and hence contribute to their control by biological rather than chemical means.
4.4 Air	ENV5. Preserve or improve the air quality.	<p>The farmer shall identify all sources of emissions which effect air quality. The following should be considered as potential sources:</p> <ul style="list-style-type: none"> ▪ Manure storage ▪ Waste storage ▪ Burning waste ▪ Pesticide application. ▪ Manure application

		<ul style="list-style-type: none"> ▪ Dust from harvest or cultivation ▪ Machinery exhaust fumes ▪ Noise pollution from machinery particularly at night <p>If sources are identified that effect the quality of air on a regular basis, mitigation plans shall be put in place.</p>
4.5 Climate change	ENV6. Minimize adverse impacts on the global environment and climate change.	<p>The farm shall strive to minimise greenhouse gas emissions:</p> <ul style="list-style-type: none"> ▪ By reducing the use of non-renewable sources of energy and increasing the use of renewable sources of energy, and by optimising the use of energy-intensive inputs, e.g. inorganic fertilisers.
4.6 Energy	ENV7. Properly chose and use energy resources.	<p>The farm should assess the different energy requirements on farm and implement practices to:</p> <ul style="list-style-type: none"> ▪ Avoid wasting energy, e.g. by combining field operations and optimising haulage distances ▪ Avoiding unnecessary operations and use appropriate machinery and equipment ▪ Increase the use of renewable energy and fuels on-farm ▪ Record and monitor fuel usage
4.7 Waste	ENV8. Use crop by-products as much as possible on the farm.	<ul style="list-style-type: none"> ▪ The farm shall continuously reduce, reuse and recycle the quantity of waste and by-products of harvesting and processing, e.g. by composting organic debris on-farm and re-using it for soil conditioning (where there is no risk of disease transmission).
4.7 Waste	ENV9. Properly handle, and if possible recycle waste generated by the farm.	<ul style="list-style-type: none"> ▪ Untreated farm sewage water and other farm effluents shall not be used on the farm nor be discharged into natural superficial waters. ▪ Treated sewage shall be spread in the field only under proper climatic and biological conditions, as per national and local legislation. ▪ Inorganic waste that is not recyclable, including chemical and toxic substances shall not be burned. They shall be handled appropriately. ▪ Used containers which have held hazardous substances, e.g. crop protection products and antimicrobials, shall be disposed of in a proper manner, and never used to store water, food or feed.. ▪ All waste storage shall be assessed for risks considering the following: <ul style="list-style-type: none"> - Location of store - Does the store need to be secure - Capacity of the store - Is the store purpose built to contain the waste (e.g. is bunding required) - Storage of waste is segregated (e.g, hazardous from non-hazardous, waste is not stored with non-waste) - Procedures are in place to contain spills ▪ A waste management plan is recommended, which: <ul style="list-style-type: none"> - Identifies all potential waste streams within the business

- | | | |
|--|--|---|
| | | <ul style="list-style-type: none">- Identifies hazardous and non-hazardous waste- identifies the measures in place to reduce, reuse and recycle waste as well as to prevent pollution- outlines emergency action procedures in order to minimise the risk of pollution from accidents concerning hazardous waste. |
|--|--|---|