

Disease, Insect & Weed Control



Principle: On-Farm Disease & Insect Control



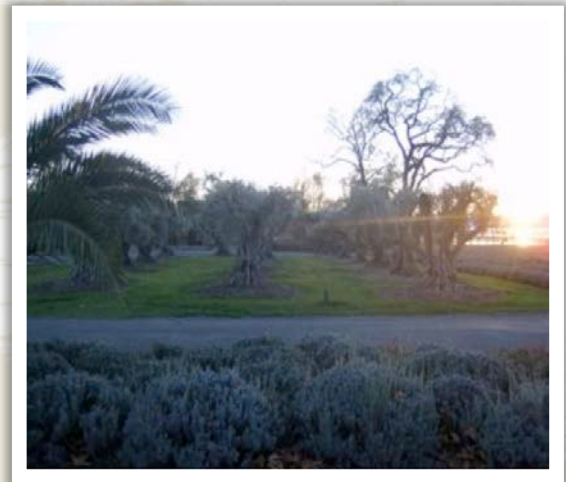
Botanical Diversity



Predator Habitat



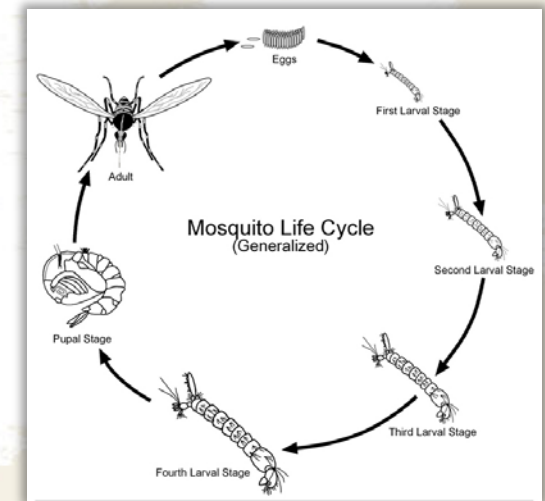
Balanced Living Nutrition



Air Flow/ Light Penetration



Crop Rotation



Understanding pest life cycles

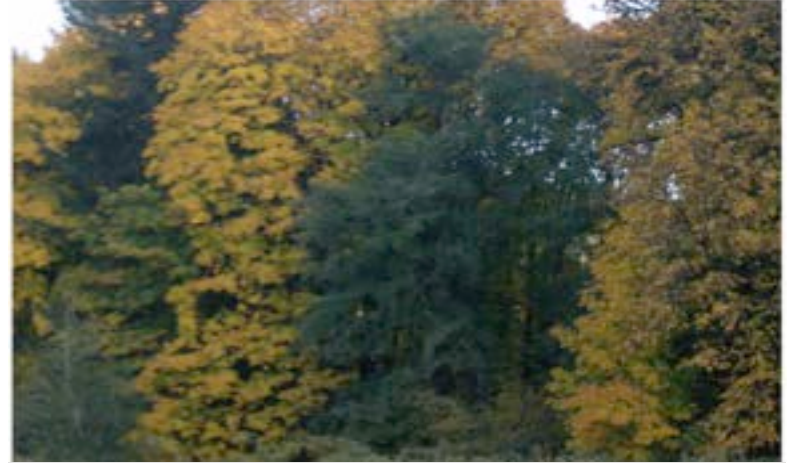


Botanical Species Diversity- Example: agro-forestry

Predator/Pollinator Habitat



Planted areas



Wild areas



Corridors and Islands / Connectivity

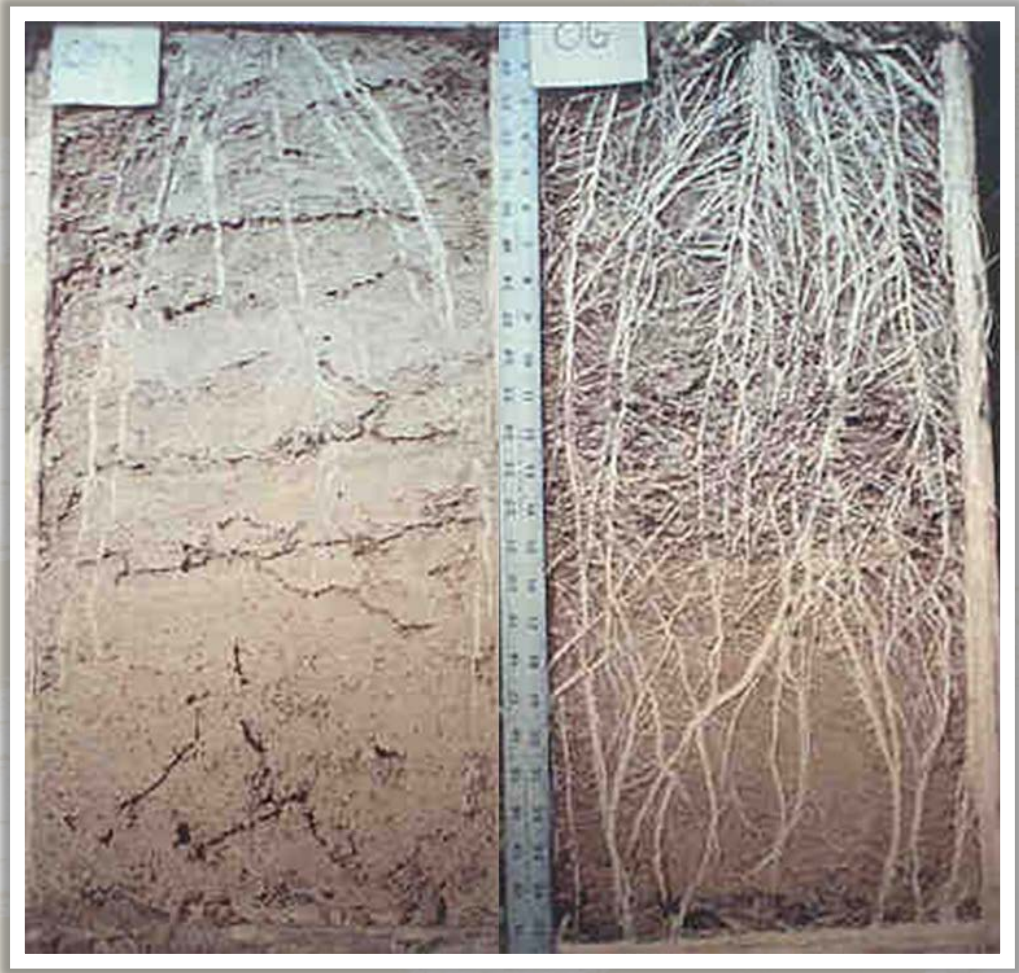
Effect of Commonly Used “Organic” Pesticides on Beneficial Organisms



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PESTICIDE	NON-TOXIC	LOW TOXICITY	HIGHLY TOXIC
Insecticides/Repellants/Pest Barriers			
<i>Bacillus thuringiensis</i> (Bt)	Green		
<i>Beauveria bassiana</i>			Red
Boric Acid		Orange	
<i>Cydia pomonella granulosis</i>	Green		
Diatomaceous Earth			Red
Garlic	Green		
Insecticidal Soap ^a			Red
Kaolin Clay	Green		
Limonene ^a		Orange	
Neem ^a		Orange	
Horticultural Oil ^{a,b}			Red
Pyrethrins ^c			Red
Rotenone ^c			Red
Ryania/Ryanodine		Orange	
Sabadilla ^c			Red
Spinosad			Red
Herbicides/Plant Growth Regulators/Adjuvants			
Adjuvants		Orange	
Corn Gluten	Green		
Gibberellic Acid	Green		
Horticultural Vinegar		Orange	
Fungicides/Bactericides			
Copper		Orange	
Copper Sulfate			Red
Lime Sulfur ^a , Sulfur ^{c,d}		Orange	

Balanced Crop Nutrition



Example: Based on living dynamic relationship between plant roots ,soil biology and the resulting release and uptake of crop nutrition.

Crop fertility based on the development of soil humus, including the associated intensification and diversification of the soil community, provides living and balanced fertility to crops.

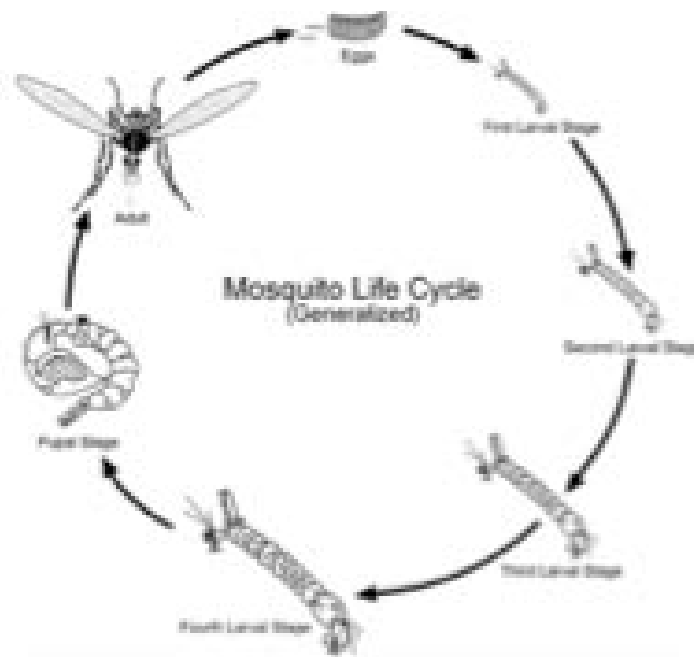
Attention to light penetration & airflow



Crop Rotation



Understanding insect & disease life cycles



NOTE:
Each larval stage is longer than the previous one. Molting occurs between each larval and pupal stage.
Larval and pupal stages are aquatic.

By knowing when a insect or disease species is the most virulent or susceptible crop loss can be avoided by the timing of planting and also by breaking the life cycle of the pest when it is most susceptible.

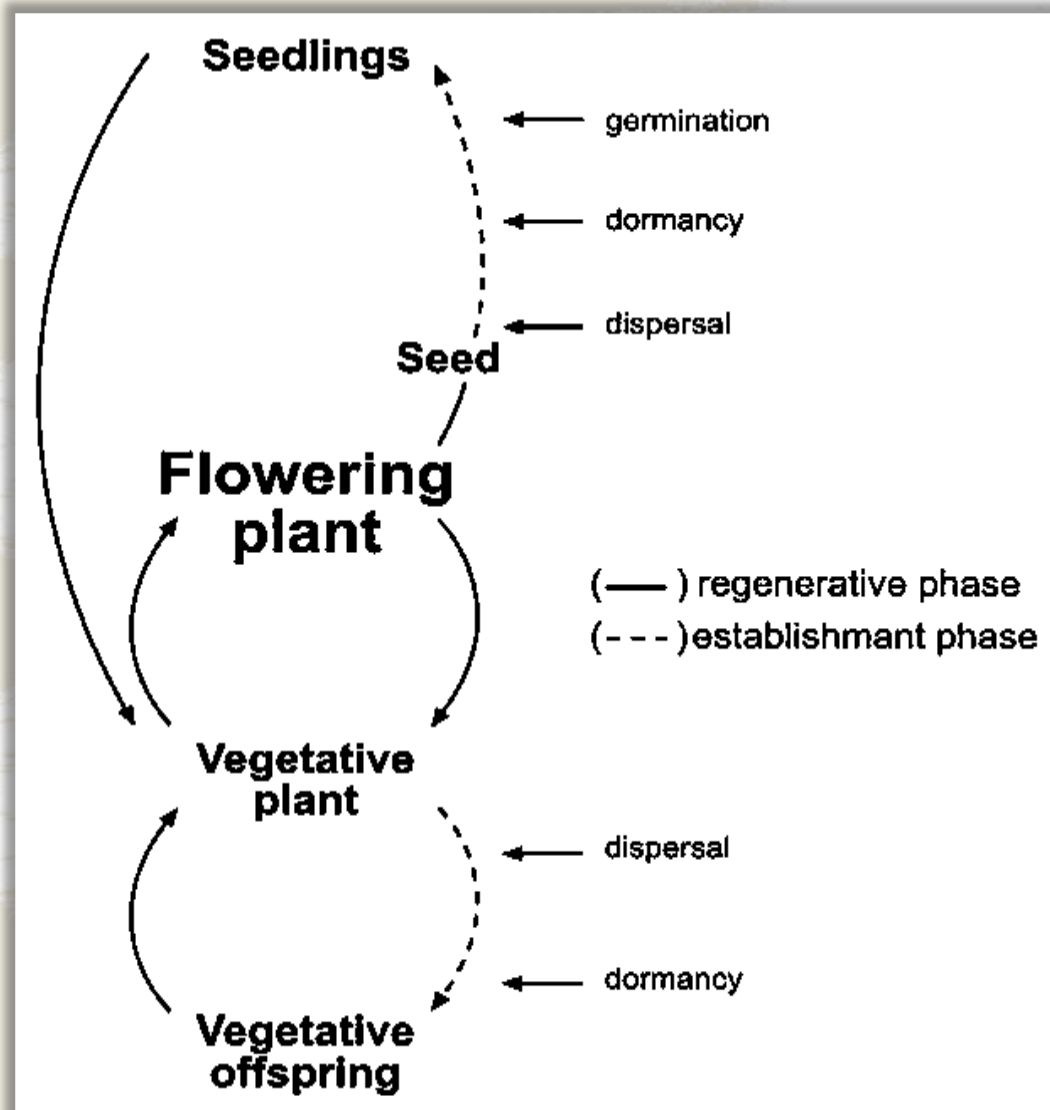
Weed Control

The foundation of weed control needs to be based on strategies that emphasize prevention located within the life of the farm. When applicable, the following techniques need to be demonstrably utilized to their maximum potential in order for allowed weed control materials to be imported.

- Understanding of weed species life cycle/ Timing of planting
- Shade/ crop canopy
- Mulching
- Crop rotation
- Identifying and avoiding the spread of invasive weed species
- Grazing
- Irrigation strategies



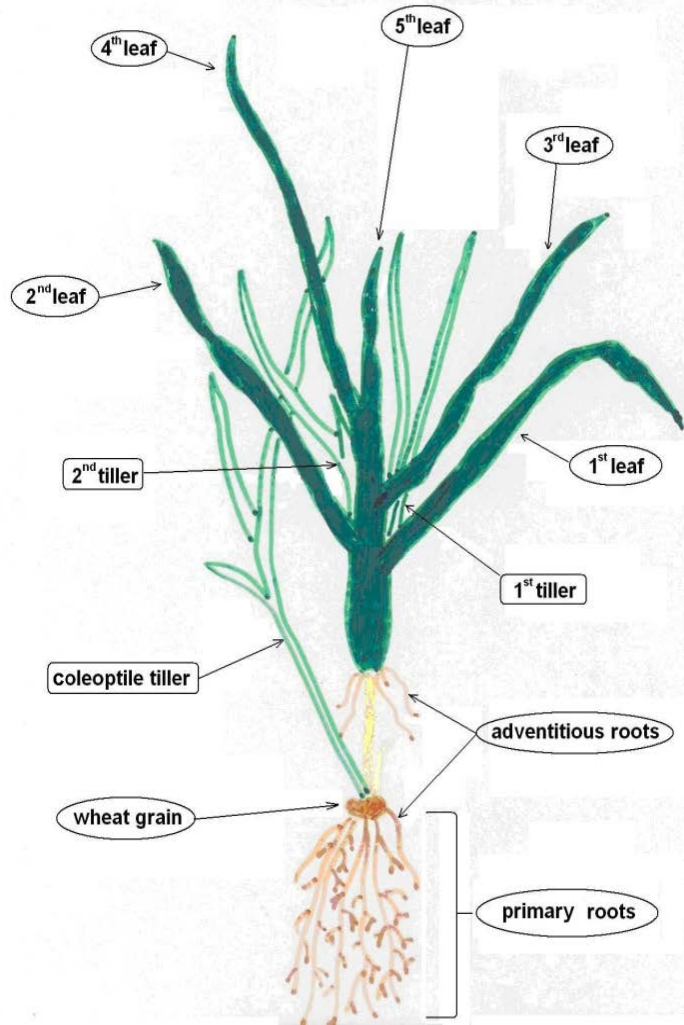
Understanding life cycle of weed species/timing of planting



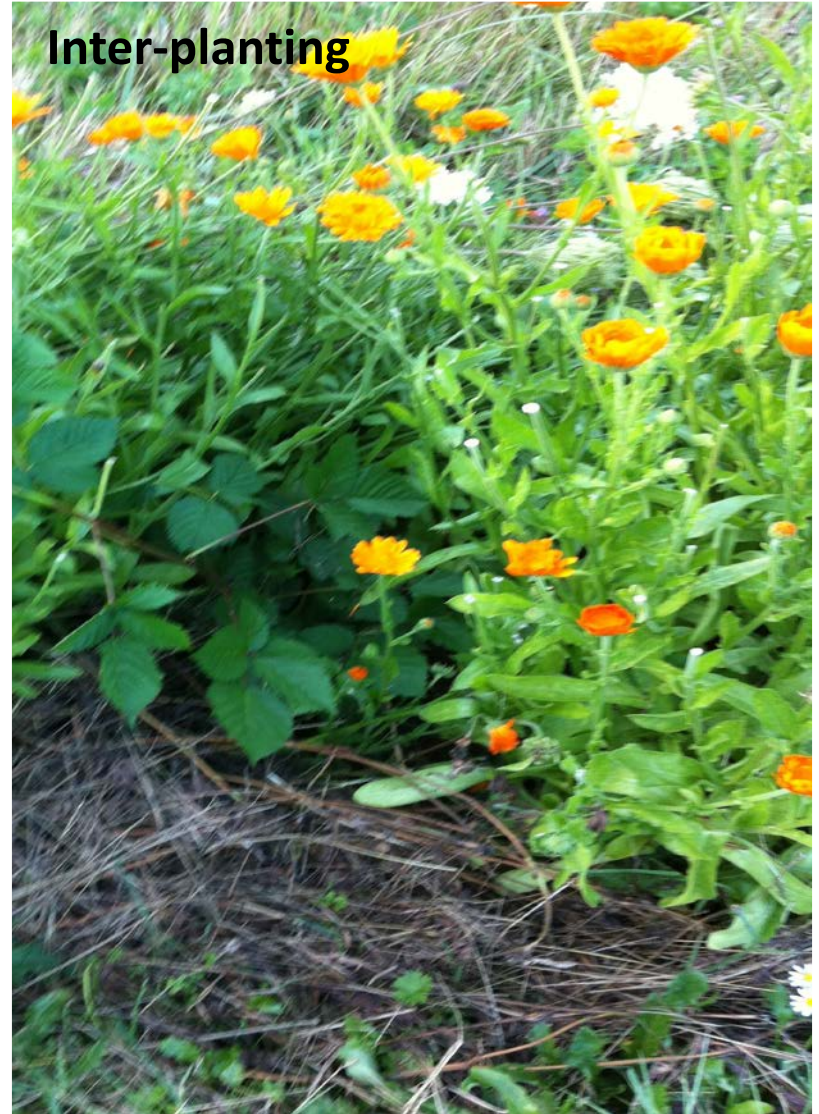
Understanding the life cycle of a weed species is a very important tool in controlling a weed species. By knowing when a weed species is the most virulent or susceptible crop loss can be avoided by the timing of planting and also by breaking the life cycle of the weed through cultivation, mowing or otherwise.

Shade Crop Canopy

Tillering plant of wheat



Inter-planting



Mulching



Grown and applied mulch



Crimp and roll no till



Living mulch

Some examples of on farm strategies of mulching for weed control:

- 1) Growing and applying mulch materials such as harvesting grain straw or hay for mulch and mowing and blowing mulch materials directly in the field
- 2) Crimp and roll no-till. See <http://rodaleinstitute.org/our-work/organic-no-till/> Crops are drilled directly into a mat created by rolling and crimping cover crops planted and grown prior to seeding.
- 3) Living mulch- a desirable living cover is maintained and instead of tilling mowing or grazing is utilized to manage the cover.



Crop rotation will aid in disrupting the live cycles of weed species.

Crops in the rotation, such as sod/ pasture and cereal grains will aid in out competing many weeds as well as inhibiting weed germination through allelopathic effects. Some common cereal grains and grasses, such as some varieties of rye, barley and oats exhibit an allelopathic effect on other seeds trying to germinate while it grows.

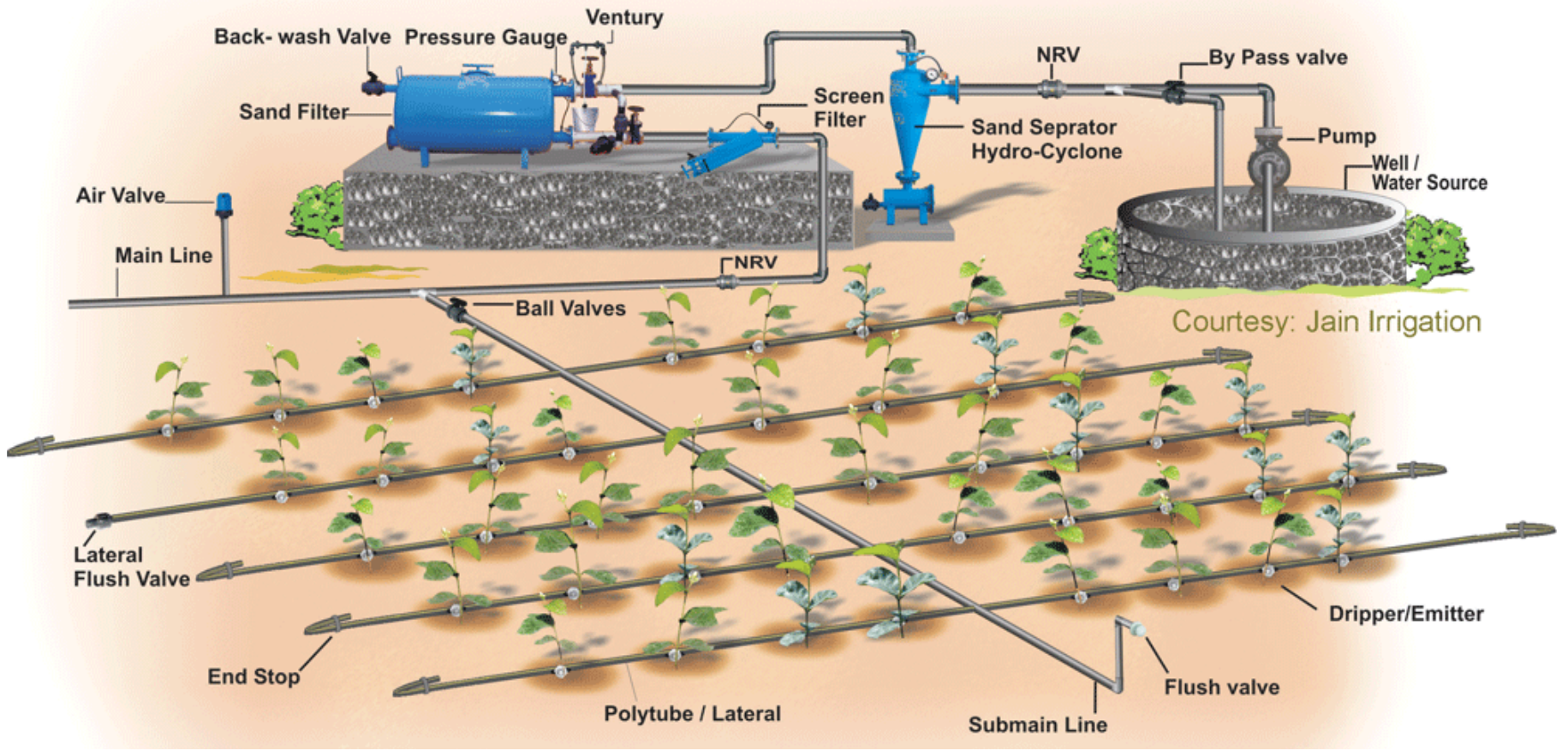
- **Must avoid imported synthetic mulch materials that will inhibit access of oxygen to the soil community.**

Identify & avoid the spread of noxious weeds



Grazing strategies can be of great help controlling the spread of many weeds such as goats and some cattle species for control of Japanese Knotweed and Blackberry.





Drip and low volume irrigation strategies reduce the incidence of crop weeds by placing water only in the root zone of the growing crop.

In addition disease issues can be reduced due to the reduction in over all humidity (vs over head watering)



Examples of pest control materials that require extra-attention

- Materials must be noted on DI Appendix 5: Allowable materials and methods for plant care and protection- at a minimum.
- Sulfur is widely used to prevent and control fungal diseases. It should be used only as needed, not according to a schedule.
- Copper products are limited to a maximum of 3# Cu/ac/year and, if possible, 1#/application.
- Biocides that are not selective to the pest species need to be used with caution. Examples: Spinosad, Pyrethrum and Copper

When use of organically approved pesticides that are broad spectrum is allowed via exemption the material's use must be done in a way that minimizes exposure to beneficial organisms. Examples- use of mass trapping w/ material isolated to traps. Applications at night etc.



Appendix D: Allowable aids and methods for plant care and protection

1. Biological agents and technologies
 - - Encouragement and use of natural control agents for plant pests (predator populations of mites, parasitic wasps etc).
 - - Sterilised male insects
 - - Insect traps (Coloured boards, sticky traps, attractants).
 - - Pheromones (Sex-attractants; attractants in traps and dispensers)
 - - Mechanical repellents (Mechanical traps, slug and snail fences and such methods)
 - - Repellents (non synthetic agents to deter and expel pests)
2. Adhesion aids and materials to promote plant health.
 - - Preparations that promote plant disease resistance, and inhibit pest and diseases:
Plant preparations (Stinging nettle liquid manure, equisetum tea, wormwood tea etc.), propolis, milk and milk products
 - - W aterglass* (sodium silicate, potassium silicate)
 - - Spreader/ stickers approved for certified organic production
3. Agents for use against fungal attack
 - - Wettable sulphur and flowers of sulphur
 - - W aterglass* (sodium silicate, potassium silicate)
 - - Potassium bicarbonate*
4. Agents for pest control
 - - Virus, fungal and bacterial preparations (e.g. Bacillus thuringiensis, Granulose virus)
 - - Pyrethrum extracts, and powder, but not for mushroom production (no synthetic pyrethroids). The use as protection in storage is allowed only if no chemical synergists are included in the formulation. The same regulation applies in agricultural production if materials with equally effective natural synergists are available.
 - - Quassia tea
 - - Oil emulsions (without synthetic chemical insecticides) based on vegetable or mineral oil in the case of perennial crops
 - - Potassium soaps (Soft soap)
 - - Gelatine
 - - Fe(III) Orthophosphate (Molluscicide)*
 - - Azadirachtin (Neem - insecticide)*
 - - Rodenticide (only in baitboxes or similar such that predators are not jeopardised)
 - - Rock flour*, coffee*
5. Allowable aids on specialised crops, perennial crops and ornamental plants