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## **List of ‘safe’ chemicals for use at community garden sites in Lee County, Florida**

**Insecticides** – *Whether the product is considered organic or non-organic, the reason it kills or disrupts is because it is toxic or otherwise harmful to the target pest. For this reason, all chemicals used for pest alleviation or protection should be used with care.*

When considering the use of a chemical, note that the intent is to:

- (1) first of all identify the pest problem
- (2) choose the appropriate chemical to alleviate the specific pest problem
- (3) change to another chemical (rotate) treatment later to prevent pest resistance

It therefore makes good sense for all participants in a community garden to become aware of what pest or nuisance is currently on high alert, and what ‘chemical’ treatment is being suggested. This prevents the use of various types of pesticides and other chemicals being in use in a small space all at once.

### **1. Organic chemical pesticides**

The following chemicals are considered organic, but are often used by large commercial agricultural producers because of their effectiveness.

#### **Neem:**

Neem is a slow-working pesticide that is best used on crop leaves that are not for eating, or for immediate use for food. It can be used to control gypsy moths, sweet potato whiteflies, mealybugs and caterpillars, among other insects. It is not toxic to mammals.

#### **Nicotine sulfate:**

A chemical derived from tobacco, nicotine sulfate is toxic to insects. Make sure to wear gloves when applying it. It can be used to get rid of aphids, spider mites and thrips.

**Pyrethrum:**

Probably the most commonly used chemical in organic gardening is pyrethrum, a chemical that comes from chrysanthemums. It is a powerful insecticide that knocks down (but doesn't necessarily kill) insects quickly. It is one of the safest chemicals for humans.

**Rotenone:**

Rotenone comes from plants in the Leguminosae (Legumes such as peas and beans) family. It is used to control leaf-eating caterpillars, as well as beetles and aphids. It is somewhat toxic to humans so label instructions on things such as harvest intervals after application should be strictly adhered to.

**Sabadilla:**

Sabadilla, which comes from the seeds of a lily, is considered the least toxic organic pesticide. It is effective on caterpillars, squash bugs and stink bugs, among others. Its dust can be irritating, so wear protection when you work with it. Some stink bugs are beneficial (particularly the colorful ones), so their presence should not always trigger the use of pesticides.

**Sulfur:**

The mineral sulfur is probably the oldest pesticide and is used to treat mildew, rust, leaf blight and fruit rot. Some insects, such as spider mites, are very sensitive to sulfur. It can be applied as a powder, paste or liquid. It can irritate the eyes, but is not otherwise harmful to humans or other mammals. Care should be taken to apply sulfur early or late in the day as intense sunlight also intensifies the burning effect of this chemical which may result in the death of plants.

**Bt (*Bacillus thuringiensis*):**

Not considered a chemical, Bt is a naturally occurring bacterium common in soils throughout the world. Several strains can infect and kill the immature feeding stages of insects (caterpillar stage). Because of this property, Bt has been developed for insect control. At present, Bt is the only "microbial insecticide" in widespread use. The most commonly used strain of Bt (*kurstaki* strain) will kill only leaf- and needle-feeding caterpillars. More recently, strains have been developed with activity against some leaf beetles, such as the Colorado potato beetle which attacks many other types of crops in Florida.

## **2. Non-Organic Chemical pesticides**

**The following chemicals are considered non-organic. They are commonly used by large commercial agricultural producers as well as small backyard operators due to their long history of usage without major side effects over the decades.**

**Malathion:**

Malathion is an insecticide of relatively low human toxicity and the most commonly used insecticide in the United States and is very effective in the control of whiteflies and stinkbugs on tomatoes.

**Lannate:**

Lannate is a broad spectrum (kills many different insect pests) quick acting insecticide which is effective in the control of caterpillars and sucking insects such as stinkbugs. At certain rates of application, Lannate does not kill certain beneficial insects such as spiders.

**Kelthane:**

Red spider mite, two spotted spider mites and broad mites are microscopic and can severely affect plant production. Kelthane is a miticide

(targets mites) that is very effective against most mites on crops such as tomatoes, peppers and potatoes.

### **3. Commonly used chemical pesticides NOT recommended and why.**

**Sevin:**

Sevin is the trade name for a widely used synthetic insecticide containing the active ingredient **carbaryl**. Carbaryl belongs to the chemical class called carbamates. Although Sevin is only moderately toxic to mammals and is still widely used in gardens and landscapes, it is highly toxic to honey bees and many other beneficial insects and mites. Sevin is particularly hazardous to honey bees because the particles of insecticide resemble pollen and can be carried back to the hive. For this reason, and because

community gardens encourage beneficial insects such as bees, the recommendation is to **avoid using carbaryl around flowering plants.**

**Permethrin:**

The use of the naturally occurring insecticide pyrethrum was discussed above. There are also synthetic versions of pyrethrum (Called Permethrins) that are not used in organic farming, but are used to control insect pests in a similar way. Because it is a neurotoxin, Permethin is NOT recommended for use in a community garden environment.

### **4. The use of foliar fertilizers such as Miracle Gro products**

Plants require nutrients in order to grow, flower, bear and hold fruits. Not all the required nutrients are available from the soil in which it is planted so gardeners often apply fertilizers to the root zones or by foliar application. Many fertilizers are organic as they are sourced from naturally occurring minerals of potassium and phosphorus, for example. This may include many of 'Scotts' Miracle Gro products as well as locally sourced nutrients such as worm teas. Because these are used only by plants in self-contained boxes, the use of these products will have no effect on neighboring boxes of plants.

### **5. The use of non-organic weed killers (Herbicides):**

**Glyphosate:**

Sold under hundreds of different brand names, glyphosate (commonly known as Round-up) breaks down very quickly after it is applied. Glyphosate is a very economical and effective broad spectrum herbicide but be aware of the percentage in different products as it can vary widely. The concentration will be mentioned on

the label. For example; a \$4 bottle of weed killer may have 10% glyphosate and a \$6 bottle may have 20% - so the latter, although more expensive, is the better deal.

While much as been said about it over the years, subchronic and chronic tests with glyphosate have been conducted with rats, dogs, mice, and rabbits in studies lasting from 21 days to two

years. With few exceptions there were no treatment-related gross (easily observable) or cellular changes in these animals. In a chronic feeding study with rats, no toxic effects were observed in rats given doses as high as 31 mg/kg/day, the highest dose tested. No toxic effects were observed in a chronic feeding study with dogs fed up to 500 mg/kg/day, the highest dose tested. In tests conducted by the University of California (Davis), Glyphosate was shown to be relatively non-toxic to honeybees. Glyphosate is a contact herbicide that is recommended for use in the general areas (not in box beds) of the community garden.

#### **Other Herbicides:**

Herbicides are sold under different names, which are combinations of the active ingredients that have met EPA approval. Most herbicides cause death by affecting a biological or physiological process in the plant. Some affect the plants ability to absorb sunlight (photosynthesis), thus causing death by starvation.

Other herbicides cause death by disrupting hormonal or other chemical balance of the plant resulting in growth retardation or inability to take up available nutrients. The persistence (how long it takes the herbicide to break down) of many herbicides available for purchase in Florida vary, but may be as quick as 2 days in many

instances. Many herbicides approved for use in Florida by the EPA are broken down by sunlight.

#### **2,4-D**

The herbicide called 2,4-D (2,4-Dichlorophenoxyacetic acid), the most widely used herbicide in the world, is a synthetic plant hormone used to control broadleaf weeds. Single oral doses of 5 and 30 mg/kg body weight of 2,4-D did not cause any acute toxic effects in human volunteers.

#### **Dicamba (brand names - Banvel, Oracle, Vanquish):**

Dicamba (3,6-dichloro-2-methoxybenzoic acid) is used to kill annual and perennial weeds and broadleaf weeds before and after they sprout.

#### **Clethodim (brand names - Select, Centurion, Compass):**

Clethodim is a systemic post-emergence herbicide that is rapidly absorbed and readily translocated from treated foliage to the roots and growing plant parts. Clethodim is a lipid (fatty acid) inhibitor. Plant lipids (fats) are vital to the integrity of cell membranes and to new plant growth. Broadleaf plants are tolerant to this herbicide family, but a wide range of perennial and annual grasses are susceptible, thus making Clethodim a very effective grass killer.

## **6. Some organic herbicide options**

Other greener options for killing weeds (depending on the type) that I have heard of or worked with a bit include the following:

**Neat white vinegar** is an earth friendly broad leaf weed killer. Vinegar is most effective when applied on a sunny day.

A **strong salt solution or granular salt application** can be used on gravel or shell surfaces and where weeds have sprung up between cracks or joints in pavers. It's probably best not to use this in open areas

where other plants are close by as repeated applications can cause the salt to leach over a wider area, kill other plants and prevent new plants from growing in the affected area.

**Lemon Juice** is said to be highly effective in killing weeds of all types and it will break down very quickly. BUT, it makes great lemonade on a hot day!

The use of **corn gluten meal** as an herbicide was discovered by accident during turfgrass disease research at Iowa State University. Researchers noticed that it prevented grass seeds from sprouting. Further research at Iowa State showed that it also effectively prevents other seeds from sprouting, including seeds from many weeds such as crabgrass, chickweed, and even dandelions. Components in corn gluten meal called dipeptides are apparently responsible for herbicidal activity.

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