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POETCom

Pacific Community
Communauté du Pacifique

Produced by the Foundation of Rural Integrated Enterprise & Development from trials conducted over the last five years.

Who we are

The Foundation for Rural Integrated Enterprises & Development (FRIEND) is a homegrown community development Organisation headquartered in Lautoka on the west coast of Fiji's main island, Viti Levu.

The hallmark of FRIEND's work is the integrated approach it brings into community development, working with communities in rural and under-served regions around Fiji. Through its integrated social, health and economic interventions, FRIEND empowers communities through knowledge, skills and resources to improve their lives and break out of poverty. With the support of donor partners and through its own funding, FRIEND engages Communities in Programs focussed on Good Governance, Sustainable Livelihoods, Disaster Preparedness and Healthy Living, targeting women, youths, marginalised and men in each community we work in for sustainable development.

Food Systems and Health

Our GROW (Agriculture) program is about creating sustainable and organic farms for Food Security, livelihood and Health. We encourage the use of natural methods to fertilise the soil, manage soil water needs, manage weeds and deal with pests.

We discourage the use of any form of artificial chemicals in any of the methods mentioned because evidence has proven that these chemicals especially weedicides (chemicals that kill grass and unwanted plants) and pesticides (chemicals that kill unwanted insects and small organisms) directly cause Cancer or are highly likely to cause cancer in agriculture based communities.

The International Agency for Research on Cancer (IARC) of the World health Organisation (WHO) has identified chemicals like Glyphosate and Orthene as highly likely to cause cancer. Both these two chemicals are heavily used in Fiji by farmers, farm labourers, road and railway maintenance labourers and market vendors.

Other International Research organisations in Health, Food and Nutrition, Agriculture and Environment have provided the latest findings of how diseases like Diabetes Mellitus are caused by Endocrine Disrupting Chemicals in Food and water Sources. This means that the heavy usage of artificial chemicals (pesticides, weedicides, growth enhancing) on crops and livestock are causing problems with the body's hormones and hormonal systems, therefore, leading to the development of the many diseases with unclear causes and incurable complications like Diabetes (2nd highest killer in Fiji), Cancer (3rd highest killer in Fiji) and other Non-Communicable Diseases burdening our already struggling families, Health System and our National Economy.

To achieve good health and sustainable livelihoods for our families and communities we recommend, encourage and practice organic agriculture. Developing countries like Cuba, Nepal and India have successfully grown organically for home use and commercial purposes. We Can too!

Organic agriculture uses natural ingredients for soil strengthening and pest management improving biodiversity. Biodiversity means a range of plant and animals live together without harming food production. We encourage bee farming for pollination and honey provides a source of income. Free range poultry can provide food security and income but also natural manure and assist with pest management like caterpillar infestation.

Farmers are encouraged to grow a wide range of resilient varieties of crops to meet nutrition and food security needs of their families and supply demand that comes from the market. Where there is surplus FRIEND provides training in solar drying of local fruits and root crops and other staple to make gluten free flour for food security and the market. Farmers are also encouraged to generate seeds from healthy fruits by drying and storing these appropriately. Interested farmers in each community form peer groups to work together to encourage each other and ensure that there is consistency in organic practices for sustainable markets.

What is Organic Agriculture for us in Fiji and the Pacific?

Organic Agriculture is using farming, harvesting, preservation and storage methods that will ensure that food is grown, eaten or sold without using chemicals that will harm human health, the soil, other non-farm plants and animal species, waterways or pollute the air.

There are recognized rules and standards that make sure these methods are continuously followed by everyone - farmers, vendors, middle - men, buyers, manufacturers etc. so food remains healthy and the environment is protected.

Those who practice organic farming are trained on these methods, rules and standards and get internationally recognized organic certificates. To maintain the certificate they have to consistently follow the organic methods, rules and standards. In the Pacific organic growers are guided by the Pacific Organic Standard. FRIEND uses this Pacific Organic Standards for certification of farms.

The Pacific Organic Standard is developed specifically for Pacific farmers, in recognition of the unique context of the forms, styles, and methods of farming in the Pacific Islands and gives farmers, processors and consumers' confidence that they are helping preserve healthy lifestyles for all the people involved in organic agriculture. Pacific Organic Standard was developed by Pacific Organic & Ethical Trade Community (POETCom) Standards and Certification Committee and is recognized by the International Federation of Organic Agriculture Movement (IFOAM). POETCom is housed at the Land Resource Division of the Secretariat of Pacific Community (SPC).

Importance of Soil Health

Agriculture relies on healthy soils. Just like our physical bodies, when plants have good nutrition they are able to fight diseases. Soil in our natural forests are very fertile due to layers of diverse plants, root systems that hold soil from erosion and natural composting from leaves and bugs that die.

Traditionally when our forefathers dug their root crop, they used to bury the parts not used back in the soil to compost and there was planting of diverse crops in one plot.

In Fiji we have many natural components that can provide soil health. Composts can be developed from leaves, fruit peelings, bones and sea food remains, sea weed and other biodegradable (able to rot naturally) matter. Seaweed and fish bones make for very rich calcium based fertiliser. Green manure, various types of creeping legumes help retain soil moisture and provide nitrogen to the plants. Fiji is very fortunate to have a wide range of leguminous plants from edible beans to Gliricidia and saijan (moringa). Saijan leaves when soaked in water for two weeks, and sprayed on newly planted seeds, speeds up the growing of healthy seedlings.

Animal manure like poultry and cattle waste can be used if they are well decomposed. Countries like India collect cattle urine (rich in urea) from dairy sheds, store for two weeks, then use one part of the substance with 4 parts of water to fertigate (fertilise +irrigate) with urea as well as repel pests.

Grass management is an important part of agriculture. Where grass is not a nuisance, it should be left to dry naturally during dry spells. Grass helps cover and protect the soil from direct sunlight, assisting in retaining soil structure and moisture. Taller reeds can be cut and spread in the fields to curb overgrowth or unwanted growth of grass. Total removal of grass through spraying and burning leaves the soil prone to dryness during dry spells and erosion of the top organic rich layer during heavy rainfall.

Mulching is a method used by our forefathers and is highly promoted in organic agriculture . To mulch is to spread the already cut or rotting grass, leaves or branches around the root/stem of crops. This prevents grass from growing, maintains moisture in the soil and when fully rotten will immediately add manure for the plants/crops.

Intercropping of a variety of crops and crowd planting can also be used for grass management. By planting different crops together, side by side, or crowding the same crop will not allow any unwanted grass in between to receive sunlight, thereby reducing its growth altogether.

Here are some simple tips that we use for improving soil health. Many of these may not have pleasant smells but are harmless when inhaled and are surely good for our plants ☺ It is important to use knapsack sprayers that have not been contaminated with chemical sprays. Always use protective gear while preparing or spraying the following.

Organic Soil Improvement Practices

Poultry liquid Manure

Materials	Method of Preparation	How to use	Soil improvement
To make your own poultry liquid manure: • Poultry manure • 55L drum • Empty sack • Wooden lid • 20L water 	Steps in making your own poultry manure: • Prepare a 55L drum • Fill the poultry manure in the sack and tie. • Fill 20L of water in the drum and put a stone on top of the sack to keep the sack of manure underwater. • Cover the manure with a lid. • It will take 3 weeks for the liquid manure to be ready.	Using a knapsack sprayer: • Add 1L of mix • Add 4L of water • Mix well and spray in gardens or farms. • Spray on young plants for 1 -6 weeks.	Chicken liquid manure is reported to be a great source of nitrogen and other nutrients, and can quickly perk up a plant that needs a shot of nitrogen.

Ash Fertilizer

Materials	How to use	Soil improvement
Collection of ash from your fire place. 	Wood ash fertilizer is best used either lightly scattered or by first being composted along with the rest of your compost. This is because wood ash will produce lye and salts if it gets wet. In small quantities, the lye and salt will not cause problems, but in larger amounts, the lye and salt may burn your plants.	Wood ash is reported to have an excellent source of lime and potassium for your garden. Not only that, using ashes in the garden also provides many of the trace elements that plants need to thrive. Wood ash is also useful for pest control. The salt in the wood ash will kill bothersome pests like snails, slugs and some soft bodied worm-like organisms.

Gliricidia (Bainicagi) &Saijan (Moringa) Manure

Materials	Method of Preparation	How to use	Soil improvement
To make liquid manure, you will need: • 200L drum • 5kg gliricidia leaves(bainicagi)or5kg	Steps in making the liquid manure: • Chop 5kg of glyricidia leaves and saijan (moringa) leaves and add into the drum.	Using your knapsack sprayer: • Add 1L of liquid manure • Add 10L water. • Mix and spray on the plants.	The liquid fertilizer will promote the growth and development of healthy crops due to its efficient uptake and also develops tolerance to pest attacks, as the liquid also has

saijan(moringa) leaves • 100L Water For planting in the farm borders: • Saijan and glyricidia cutting  	• Fill the drum with 100L of water and stir. • Stir every 2 weeks to encourage aerobic fermentation. • Manure will be ready after 2 months.	Also cuttings for saijan and gliricidia plants can be planted on the farms borders as leaves will be good nutrient supplement to the organic farm.	insecticidal and fungicidal properties. The liquid fertilizer also can be applied to the soil directly, if necessary. Gliricidia and saijan leaves applied as mulch improves nutrient availability and yield.

Compost Tea

Materials	Method of Preparation	How to use	Soil improvement
Making compost tea: • ¼ bucket of decomposed compost manure. • 20L water 	Steps in making your own compost tea: • Soak the ¼ compost in a full bucket of water • Leave the mixture overnight	Using a knapsack sprayer: • Add 1L of water • Add 1L of the compost tea. • Spray on the seed bed and organic farms.	When sprayed on the leaves, compost tea helps suppress foliar diseases, increases the amount of nutrients available to the plant, and speeds the breakdown of toxins.

Seaweed Manure

Materials	Method of Preparation	How to use	Soil improvement
Making seaweed manure tea: • 1 bag of any seaweed • 55L drum • 20L water 	Steps to make manure: • Collect and wash the seaweed to remove access salt, chop into pieces. • Pack the seaweed in a sack and put the sack of sea weed in a drum. • Soak the bag of seaweed in 20L of water. • Leave the mixture for 2 weeks then it's ready for application.	Using knapsack sprayer: • Add 1L compost tea • Add 2L water • Spray on the seed beds and organic farms.	Seaweed is reported to have 60 trace minerals and ready-to-use nutrients including nitrogen, potassium, phosphate, and magnesium. It also contains hormones to encourage plant growth. Unlike other manure, seaweed does not need to decomposed before being beneficial to your garden.

Developing a Compost

Materials	Method of Preparation	How to use	Soil improvement
What you will need: • Spade • Fork • Food peelings • Green leaves • Soil • Water • You can also add poultry/ cattle/ goat/ horse manure/ seaweed 	Steps in making your compost: • Dig a compost pit with 1m x 1m and ½ metre deep. • Add food peelings into the pit then green leaves. (you can also use poultry, cattle, horse manure), add earthworms if possible. • Add soil and water the compost. • Turn the compost every week to allow the center of the pile to heat up and promote maximum bacterial activity. • It will take 3 months for compost to be ready, if it's turned frequently. Note: Soil is to cover the compost from food flies and rodents. Keep compost moist.	• Add compost to cultivated land before planting. • Dig and add around plant beds.	Compost is rich in nutrients and improves the fertility of your soil, making plants healthier. It's a virtuous cycle for your soil. Food gets grown, consumed, and then the scraps go into your compost pile or bin. Later, the finished compost is used to nourish the soil again

Green Manure

What's Needed	Method of Planting	Benefits	Types of Beans
Planting green manure in your organic farm: • Cowpea beans • Guar beans • Mung bean (Vigna radiata) • Flat bean	• Beans can be intercropped in farms with the other crops. It is a beneficial crop that a farmer can grow together with other crops in the same piece of land.	• Green manure, in the case of legumes, fix nitrogen and contribute to farm nitrogen needs. Crowd planting of legumes may discourage the growth of weeds.	

Fish Meal Manure

Materials	Method of Preparation	How to use	Soil improvement
You will need: • Fish meal or fish waste from home • Water • 20L bucket • Water 	Steps to make your manure: • Add fish meal waste in the bucket • Add 10L of water and close the bucket lid. • Leave the mixture for 1 month. Frequently stir the mixture every week.	To use in organic farms: • Add 1L of the fish meal. • Add 2L of water • Spray in organic farms once a week.	Fish fertilizer improves soil health and fertility by providing the primary nutrients necessary for plants to thrive.

Pest Management

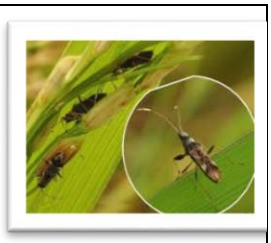
In organic farm systems a variety of methods are used for pest management. Beneficial bugs are encouraged example lady birds which feed on crop-damaging aphids, mealy bugs and other destructive insect pests. Chemical sprays kills good and bad bugs. Many of the herbal remedies repel pests. Initial infestations may require twice a week application however gradually the need for spraying gets significantly reduced when your gardens have found its own balance. A constant vigil must be maintained and any infestation must be sprayed immediately. It's important that any diseased plant be totally removed and not be added to compost. Resilient crops like rosella, lemon grass, basil, saijan etc. can be used as a strong barrier crop to ensure spraying or bugs from other farms does not have direct impact on your farm. Multi cropping or a variety of colours, heights and smells (herbs/ aromatic plants- mint, marigold, mother of herbs) may naturally manage pests. Here are simple

remedies that have worked for us. You can also use noni, mother or herbs, various types of basil and any variety of medicinal plants to create your mix. Don't forget to share your trial results with us.

Lemon Grass

Plants parts used:
Leaves & roots

Mode of action
Insecticidal, repellent

No.	Materials used	Method of preparation	How to use	Pictures of pests that injects plants/crops.
1.	Extract solution from lemon grass. • 4kg of ground lemon grass • 20 litres of water (other aromatic leaves like basil, mother of all herbs, curry leaves etc can also be used) 	• Dip the lemongrass leaves or roots in water for two weeks. • Use one part of solution and four parts of water for spraying.	Spray on lettuce, tomato & carrot. **Picture of lettuce that has leaf blight**   **Picture of lettuce when sprayed consistently**	 Leaf blight
2.	**Lemongrass, chili, bitterwood extract** Whole plant of lemongrass Chili pods Bitterwood(waiwiwi) leaves 4 ml of soap Mortar and pestle Strainer   	• Either mix 2kg of plant matter and soak to extract compounds. • Or grind 5-7 tbsp of plant juices are needed from each plant. • Mix all the plant juices and ferment in water for 1-2 weeks. • Use one part to two parts water and 4ml soap before spraying	• Dilute the mixture of plant juices with 4 litres of water. • Spray on infested plants thoroughly, preferably early in the morning or late in the afternoon.	 Rice pest

3.	**Lemon grass, Cocoa, chili, tobacco and Tinospora*(drauniwadali)*extract** 25 kg of lemongrass  25 kg of fresh cocoa leaves 1 kg of chilies 10 kg of tobacco leaves 5 kg of Tinospora   Drum Soap Knife  	• Chop these plant materials. • Put into a drum full of water. • Set aside for 1 month to allow fermentation	• Dilute 1 litre of stock solution with 4 litres of water • Add soap. • Stir well. • Spray on infested plants thoroughly.	Most agricultural pests

Papaya

Plant parts used:
Leaves, seeds, unripe fruit

Mode of action:
Repellent, insecticidal, rodenticidal, fungicidal

Formulation

Materials	Methods of preparation	How to use	Plant pests
Papaya leaf extract • 50 grams of finely shredded papaya leaves • 8-12 ml of soap • Muslin cloth • Pail • Water	• Soak shredded leaves in 100 ml of water. • Stir vigorously. • Let it stand overnight. • Squeeze the extract using • Muslin cloth.	• Dilute the extract with • 2-3 litres of water. • Add soap. • Stir well. • Spray thoroughly on • Infested plant parts. **Picture of tomato plant affected leaf rust**   **Picture of tomato that sprayed consistently**	Leafy caterpillars  Coffee rust  Leaf rust  Mosaic virus  Powdery mildew

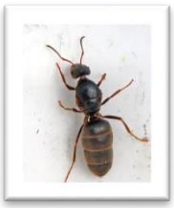
Papaya water extract • 1 kg of papaya leaves • 10 litres of water • Mortar and pestle • Soap • Strainer • Pail	• Pound the leaves. • Add pounded leaves into the water. • Leave to stand for 2 days. • Strain.	Spray on the target pests. **Picture of English cabbage eaten by grass looper**   **Picture of English cabbage sprayed consistently**	Grass looper  White grub 
Papaya water extract • 1 kg of papaya leaves • Water • Knife • Soap • Cotton sack • Pail	• Finely shred the leaves • Shake vigorously in a1 litre of water. • Squeeze through a cloth sack.	Dilute the filtrate with 4 litres of water. Spray on the target pests. **Picture of tomato eaten by fruit flies**   **Picture of tomato that sprayed consistently**	Flower thrips  Fruit flies 

Chili

Plant parts used:
Fruit & seeds

Mode of action:
Insecticidal, repellent

Formulations

Materials	Method of preparation	How to use	Target pests
All- purpose insect pest spray • 16 tsp powdered red hot pepper • 16 garlic bulb • 10 small onion • 16 litre of water • 16 tbsp of soap • Knife • Strainer • Basin/pail	• Chop onion and garlic. • Add powdered red pepper. • Mix the above ingredients into the water. • Soak for 1 hour. • Strain. • Add soap. • Stir well.	• Fill the sprayer. • Spray plants thoroughly. • If no sprayer is available, make soft straw brush and wet plants with the extract. • Repeat spraying when necessary. **Picture of broccoli leaves eaten by leaf eating pests**   **Picture of broccoli leaves when sprayed consistently**	Leaf eating pests 
Chili spray • 4 cups of ripe hot peppers / chillies or 5 cups of chili seeds • 30 grams of soap Cooking pot Strainer	• In a pot, boil ripe pods or chili seeds for 15-20 minutes. • Remove water from fire after it boils and add 3 litres of water. • Cool and strain. • Add soap. • Stir well.	Spray on infested plants. **Picture of chilli plants infected by mealy bugs.** 	Ants  Aphids  Caterpillars

		 **Picture of chilli when sprayed consistently**	 Mealybugs 
Chili and neem leaves extract • 10-20 pieces of hot pepper • 4 kg fresh neem leaves • 20 litres of water • 2 tbsp of powdered soap • Mortar and pestle • Basin/pail	• Pound hot pepper and neem leaves. • Add to 1 litre of water. • Soak the mixture overnight • Strain.	• Add 1 part to 4 parts of water, powdered soap to the filtrate. • Stir well. • Fill-in the sprayer. • Spray on infested plants. • Spray early morning or late afternoon. **Picture of bean plant damage by army worms**   **Picture of bean plant that sprayed consistently**	Armyworm  Whitefly  Mosaic virus 
Chili and neem seeds extract • 12 pieces chopped hot chili • 200 grams fully dried and shelled neem seeds • 4 litres of water • Basin/pail	• Grind the neem seeds and soak in water and add the chopped hot chilli and let it stand overnight. • Strain.	• Fill the sprayer • Spray on the infested plants thoroughly. **Picture of cauliflower damage by the pest on the last column**	Aphids  Diamondback moth

• Grinder • Knife		  **Picture of cauliflower that sprayed consistently**	 Sucking and chewing insects  Whitefly 
Chili, custard apple, neem extract • 25 grams of dried chili pods • 100 grams of custard apple leaves • 50 grams of crushed neem fruits • 20 ml of soap water • Grinder • Wide-mouth bottles • Pail	• Grind dried chilies. • Soak overnight in 100 ml of water. • Soak crushed neem fruits over-night in 200 ml of water. • The next day filter both extracts. • Grind the custard leaves. • Add 500 ml of water. • Strain. • Mix all 3 the solution.	• Add 5-6 litres of water to the filtrate. • Add soap water • Stir well. • Spray on infested plant parts, preferably early morning or late afternoon. **Picture of cabbage damage by leaf roller insects**   **Picture of cabbage that sprayed consistently**	Aphids  Leaf-rollers  Red scales  Spotted beetles 

Cinnamon

Plant part use:
Cinnamon stick, Spice/ Powder

Mode of action:
Insecticidal, repellent

Formulation

Materials	Method of preparation	How to use	Target pests
All- purpose insect pest spray • Empty water gallon • Cinnamon powder or sticks	• Mix 4 tbsp with half a gallon of water/ 500 g of sticks • Shake it vigorously and let it sit for a few hours. • Strain the liquid. • Fill spray bottle with the liquids. 	• Spray the stems and foliage of any affected plants or plant suspect to be become affected. • Spread the left over residue around the base of the plants.   	Nematodes Ants  Beetles.  Fungal disease Damping off Mold Phytophthora

Coconut Oil and Water

Mode of action:
Repels aphids and white flies

Formulation

Materials	Method of preparation	How to use	Target pests
• 10ml coconut oil • 10 litres of water • 100ml Soapy water • Spraying tank • Measuring jug	• Mix 10ml coconut oil with 100ml soapy water. (Donot use detergents) • Dilute the mix with 10 litres of water before filling it into the spraying tank. • Best time to spray is at sunset to prevent burning of the vegetables leaves. Spray 2- 3 times in a week.	• Spray on the chilli, cabbage, long bean, cowpeas, broccoli, cauliflower and tomato. **Picture of chilli leaves damage by aphids**   **Picture of chilli leaves when sprayed consistently** **Picture of broccoli leaves eaten by leaf miners**   **Picture of broccoli leaves when sprayed consistently**	White flies  Aphids 

Neem Leaves

Plant parts used:
Neem Leaves

Mode of action:
Insecticidal, fungicide

Formulation

Materials	Method of preparation	How to use	Target pests
• 20kg neem leaves • 10 litres of water • 20 full spoons of soap water	• Crush and soak neem Leaves in 10 litres of water overnight. • Squeeze and soak neem leaves again to take out all neem juice. • Filter the leaves using fine cloth if using knapsack to Spray. • Add soap water to the neem solution so that it sticks to the surface of the plant leaves.	• Apply neem pesticides to plants in the afternoon around sunset **Picture of bean leaf that has flea beetle**   **Picture of the bean leaves when sprayed consistently.**	Aphid  Flea Beetle  Scale insects black moth  Nematodes. 

Kava Kosa

Plant parts used:
Left over Kava root after use (kosa)

Mode of action:
Insecticidal, repellent

Formulations

Materials	Method of preparation	How to use	Target pests
• 1 kilo kava kosa (kava leaves can also be used) • Cover the kosa with water in a tank • Strainer • Bucket	• Soak 1 kilo kava kosa in the tank for 1 month, ensure water is above the kosa mark. • After 1 month add four parts more water. • Strain the liquids to the bucket.	• Fill the mixture in the spray tank. • Apply the solution properly to the plant • Apply twice if needed **Picture of broccoli eaten by leaf eating pests**   **Picture of broccoli when sprayed consistently**	Leaf eating pest 

Layalaya / Ginger

Plant part use:
Layalaya/ginger root

Mode of Action:
Insecticidal, fungicidal

Formulations

Materials	Method of preparation	How to use	Target pests
• 10 kilo gram layalaya or ginger • 100 litre of water • 1 litre soap water	• Cut 10 kilo grams of layalaya into fine pieces. • Soak layalaya into 100 litre of water in the tank, and let it rot for 1month • After 1 month, scoop out 1 litre of the mix from the tank • Mix 4 litre water and 1 litre soap water together with the mix of layalaya/ginger. • Strain the liquid so it does not block the nuzzle of the spray tank.	• Apply the solution to the top and bottom part of the plant leaves every morning for 3 weeks. **Picture of chilli fruits not sprayed**   Picture of chilli fruit when sprayed consistently.	Aphids  Mealy bugs  Spider mites 

Standard procedures for the preparation and application of the plant extracts

1. Select plant parts that are free from diseases.
2. When storing the plant parts for future usage, make sure that they are properly dried and are stored in an airtight container (never use plastic container), away from direct sunlight and moisture. Make sure that they are free from moulds before using them.
3. Use utensils for the extract preparation that are not used for your food preparation and for drinking and cooking. Clean properly all the utensils every time after using them.
4. Use protective gear to avoid direct contact with the crude extract during preparation and application.
5. Keep plant extract out of reach of children and house pets while leaving it overnight.
6. Harvest all the mature and ripe fruits before plant extract application.

7. Always test the plant extract formulation on a few infested plants first before large scale spraying. When adding soap as an emulsifier, use a potash-based one.
8. Wear protective clothing while applying the extract.
9. Wash your hands after handling the plant extract.

Effect on humans

- Extracts are possible irritants to sensitive skins or when used in strong concentration. Do not use on damaged skin.
- Chilli irritates nose, eyes, and skin.

Effect on non-target organisms

- When using chillies spray the pepper extract concentration is very strong, it can burn the leaves and eventually kill the plants.

External links

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