



Insecticidal Soaps: An Eco-friendly Method of Pest Control

by David Trinklein



Most gardeners are good stewards of the land and attempt to control pests using tactics with minimal environmental impact. Insecticidal soaps have become an increasingly popular method of controlling certain insects in a very “eco-friendly” manner. Nearly non-toxic to mammals, insecticidal soaps may be applied to food crops until the day of harvest. They also may be used in organic production.

Soaps are salts of fatty acids. This means that the fatty acids, which are obtained from plants and animals, are made soluble for spray application via a chemical process. The

latter involves neutralizing the fatty acids with a base such as potassium hydroxide to form fatty acid salts, or soaps.

Not all soap is created equal. One cannot simply make a solution using their favorite bath soap, spray the garden and expect to get good insect control. Nature produces many different fatty acids that can be neutralized with a number of different chemical bases that results in different types of soap. Most insecticidal soaps are derived from long-chain fatty acids which make them effective in the control of pests and less damaging to plants.

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The mode-of-action of insecticidal soaps is not clearly understood. One theory suggests the soap is absorbed by the insect pest via its trachea which leads to the disruption of cellular membranes and leaking of cell contents. Another theory infers that the soap dissolves the exterior cuticle of the insect, causing it to dehydrate. Finally, there are those who maintain that the soap physically blocks the breathing openings of the insect which leads to suffocation.

Whatever the mode-of-action, to obtain optimum results from insecticidal soaps, several characteristics of the soaps need to be kept in mind when applying them. One characteristic is that insecticidal soaps are contact poisons. This means the target pest must be wetted with the insecticidal soap solution if control is to be obtained. Insects walking across the residue of soap that has dried will not be harmed.

Therefore, it is important to determine where insect pests are feeding and to cover these areas as thoroughly as possible. As a general rule, most insect pests feed primarily on the underside of leaves. Hence, thorough spraying from below will result in optimum pest control. Some insect pests are very mobile and will flee as spray is being applied. Repeated applications may be necessary to contact “escapes” when they return to feed.

Another factor to consider when applying insecticidal soaps is the nature of the water used to make spray solutions. It has been demonstrated that hard water may reduce the effectiveness of insecticidal soaps. The soap will combine with certain minerals in hard water which results in a compound precipitated from the spray solution. The mineral elements that cause the greatest problem include calcium, magnesium and iron. Therefore, it is best to use soft water when diluting an insecticidal soap concentrate to the proper strength as dictated by its label.

As a test for water quality, mix a quart of insecticidal soap spray solution with your existing water source and allow it to sit for about 30 minutes. If a scum develops on the surface of the solution, your existing water source is too hard and should not be used.

Additionally, to maintain their effectiveness, insecticidal soaps should not be mixed with certain other pesticides. The latter include copper fungicides such as Bordeaux mix, liquid copper, lime or sulfur, rotenone-based insecticides and dithiocarbamate fungicides such as maneb, zineb or mancozeb. Also, avoid mixing insecticidal soaps with fertilizer solutions used for foliar feeding.

Although insecticidal soaps do not damage plant leaves easily, phytotoxicity has been reported when the soaps are improperly used. Do not apply insecticidal soaps when the temperature is above 90 degrees F — and do not apply them when the sun is shining brightly on the plants. Soaps work best when they remain on the leaves for the maximum amount of time possible. Therefore, early morning or late evening are preferred spray times.

Also, to avoid phytotoxicity, do not apply insecticidal soaps to wilted plants or species that are known to be sensitive to them. Highly sensitive plants that are easily damaged include begonia, bleeding heart, fuchsia, gardenia, Japanese maple, lantana, lily, nasturtium portulaca and sweet pea. When uncertain about the sensitivity of a species, it is best to spray only a small area and check in a day or two to see if phytotoxic symptoms are present. The latter include yellow or brown spotting on the leaves, burned leaf tips and edges or leaf scorch.

In general, using insecticidal soaps according to label directions and when temperature and moisture conditions are proper provides an effective and safe approach to control certain garden and landscape pests. Insects that are labeled for control by insecticidal soaps include aphid, whitefly, thrips, plant bugs, spider mites, broad mites, russet mites, scale and leafhoppers. Just recently, insecticidal soaps were labeled for powdery mildew control.

As with any pesticide, always read and follow label directions when using insecticidal soaps. 🌿

July to August is the Best Time to Evaluate the Nutritional Status of Grapes, Apples, Peaches and Nectarines for Making Fertilization Plans

by Manjula Nathan



It is the time now to start thinking about tissue testing of grapes, apples, peaches and nectarines to evaluate the nutritional status and adopt a fertilizer program based on it. The MU soil and plant testing labs analyzes about 5000 to 7,000 samples each year for producers. Agronomists, crop consultants, horticulturists, turf industry and grape vineyards, orchards managers and researchers. Tissue testing has proved to be a very effective means of predicting fertilizer needs for perennial fruit crops. It has been used as a diagnostic tool for many years. To determine nutrient deficiencies, most growers rely primarily on visual symptoms, plant tissue analysis and soil analysis. Plant analysis and soil testing go hand in hand. A soil test provides an index of the nutrient that is potentially available for the crop. Plant analysis tells how much of that potentially available nutrient is actually taken up by the plant.

For perennial fruit crops (blueberries, strawberries, apples, grapes, peach, nectarine, etc.), tissue testing is the best way to monitor the plant's nutrient needs. Fertilization practices can be monitored by sampling leaves (apples, peaches and nectarines) or petioles (grapes and blueberries) during mid season and making adjustments for the following year.

Foliar samples for perennial fruit crops are typically taken once the plants start bearing regular crops. Plant

tissue sample is taken from plants when the nutrient levels in the leaves are relatively stable. The analysis and interpretations are of little value without the use of standard and consistent sampling procedures. In general, plant samples for perennial fruit crops are taken at midseason. Usually the leaf plus petioles or just the petiole alone is sampled for plant nutrient analysis. July to August is the best time to monitor the nutritional status of grapes, apples, pears and nectarines to make adjustments in the fertilizer program to avoid nutrient deficiency and to improving the fruit quality and yield for the following season. If the level of the nutrients falls outside the optimum range, the corrective measures should be taken. Optimum nutrient ranges are based on samples collected at a particular growth stage. Since the results of the plant analysis will be compared to known standards, it is important that parts of plants are sampled at a certain stage of development.

The leaf nutrient concentrations vary throughout the growing season. The general nutrient status of grape vines and orchards should be evaluated annually. This will help in evaluating the response for applied fertilizer. For plant nutrient analysis for orchards, the leaf sample should be collected between July 15th and August 15th. Table 1 lists the proper time and plant parts to sample for perennial fruit crops.

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Table 1. How and when to sample perennial fruit crops.

Crop	Stage of Growth	Plant part/Location on plant	Number of samples or plant part
Apples	July 15 - August 20	Fully-expanded leaf from middle of current terminal shoot	40 leaves and petioles
Blueberries	First week of harvest	Young mature leaf from current season's growth	40 leaves detach petioles
Brambles	Aug 1 - Aug 21	Select the most recent fully expanded leaf blade of each primocane	40 leaves detach petioles
Fruit Trees (Peach, nectarine, plums, etc.,) Fruit Trees (Peach, nectarine, plums, etc.,)	July 15 - Sept 1	Select shots at eye level from around the outside of the tree. Select shoots that make a vertical angle of 45-60 degrees to the ground. Remove 1 or 2 leaves from the mid portion of current season's growth.	30 leaves and petioles
Grapes	Veraison	Petiole from most recently matured leaf on shoot (1 petiole per shoot)	60 petioles
Raspberries	First week in August	Leaf 18 inches from tip	30 leaves
Strawberries	Mid August	Mature leaves from new growth at flowering	20 leaves

Submitting Plant Samples for Analysis

Do not include plants affected by insects, disease or pesticide damage. Where a deficiency is suspected, take samples from normal plants in an adjacent area as well as from the affected area. It is important to take a soil sample from each area. Comparing soil and plant analysis results can greatly assist in the interpretations. Collected plant tissue is very perishable and requires special handling to avoid decomposition. Therefore, fresh plant tissue should be placed in clean paper bags left open; partially air dried if possible or kept in a cool environment during shipment to the laboratory. Wash dusty plants before air-drying. Fresh plant samples should not be placed in closed plastic bags unless the tissue is either air-dried or bag and contents are kept cool. Air-drying of fresh plant tissue can be done by placing the plant tissue in an open, dry environment for 12 to 24 hours. Air dried samples can be placed in a clean

brown bag or envelope and mailed to the lab. Request a complete analysis of each plant sample including nitrogen (N), phosphorus (P), potassium (K), calcium (Ca), magnesium (Mg), copper (Cu), iron(Fe), zinc (Zn), manganese (Mn), molybdenum(MO),sulfur (S), and boron (B). The University of Missouri soil and plant testing lab offers this complete nutrient analysis package of tests for \$30 per sample. You can also submit samples for regular analysis which includes N, P, K, Ca and Mg for \$17 per sample, and regular plus micro nutrients which includes N, P, K, Ca, Mg, Cu, Fe, Mn, and Zn for \$23 per sample. Additional information on submitting samples to the lab and online fillable sample submission forms (<http://extension.missouri.edu/explorepdf/miscpubs/mp0951.pdf>) can be downloaded from the lab's website at: <http://soilplantlab.missouri.edu/soil/>. 

Missouri State Approved Soil Testing Labs

by *Manjula Nathan*

The Missouri Soil Testing Association (MSTA) Approval Program is designed to assure that results provided by participating public and private labs serving the citizens of Missouri agree with allowable statistical limits. This is accomplished by evaluating the soil testing laboratories in their performance through inter-laboratory sample exchanges and a statistical evaluation of the analytical data. Based on this premise, soil test results from MSTA approved labs will be accepted by the U.S. Department of Agriculture, Farm Service Agency (FSA) and Department of Natural Resources and Conservation Services (NRCS) in federally assisted cost share programs and nutrient management plans in the state of Missouri.

In order to be approved by the Missouri State program, the participating labs should participate in all four quarter exchanges of the NAPT program and submit the MO State data release form each year to the NAPT coordinator. The NAPT coordinator in return sends soil test data from quarterly sample exchanges of the labs participating in MSTA program to the Missouri state coordinator. The MU Soil Testing Lab director serves as the state program coordinator and performs statistical analysis of the data as specified in the MSTA program. If a lab's results fall within the allowable limits, the lab will be placed on the Farm Service Agency's (FSA) list of approved labs. A lab that is not approved may re-apply after a year. An updated listing of Missouri State Approved Soil Testing lab list can be found at: <http://soilplantlab.missouri.edu/soil/msta.aspx>

List of Missouri State Approved Soil Testing Labs July 2016 to June 2017

MU Soil and Plant Testing Lab University of Missouri 23 Mumford Hall Columbia, MO 65211 Telephone: 573-882-3250 Fax: 573-884-4288	Midwest Laboratories, Inc. 13611 B St. Omaha, NE 68144-3693 Telephone: 402-334-7770 Fax: 402-334-9121	SGS-Toulon Labs 117 East Main St. Toulon, IL 61483-0518 Telephone: 309-286-2761 Fax: 309-286-6251	Waters Agricultural Laboratories 257 Newton Highway PO Box 382 Camilla, GA 31730 Telephone: 229-336-7216 Fax: 229-336-0977
MU Delta Soil Testing Lab Univ. of Missouri, PO Box 160 Portageville, MO 63873 Telephone: 573-379-5431 Fax: 573-379-3383	Ward Laboratories 4007 Cherry Ave. PO Box 788 Kearney, NE 68848 Telephone: 308-234-2418 Fax: 308-234-1940	SGS-Belleville 1511 East Main St. Belleville, IL 62221 Telephone: 618-233-0445 Fax: 618-233-2792	Waters Agricultural Laboratories 2101 Old Calhoun Road Owensboro, KY 42301 Telephone: 270-685-4039 Fax: 270-685-3989
Custom Laboratory 204 C St. Golden City, MO 64748 Telephone: 417-537-8337 Fax: 417-537-8337	Ag Source Laboratories 1532 Dewitt Ellsworth, IA 50075 Tel: 515-836-4444 Fax: 515-836-4541	A&L Great Lakes Laboratory 3505 Conestoga Drive Fort Wayne, IN 46808 Telephone: 260-483-4759 Fax: 260-483-5274	Waypoint Analytical Inc. 2790 Whitten Road Memphis, TN 38133 Telephone: 901-213-2400 Fax: 901-213-2440
Perry Agricultural Lab PO Box 418 State Highway 54 East Bowling Green, MO 63334 Telephone: 573-324-2931 Fax: 573-324-5558	Solum Labs Inc. The Climate Corporation 615 Bell Avenue Ames, IA 50010 Tel: 515-661-5500	MVTL Laboratories-New Ulm 1126 North Front St. New Ulm, MN 56073-0249 Telephone: 507-354-8517 Fax: 507-359-2890	Ag Source Cooperative Services 106 N. Cecil St. PO Box 7 Bonduel, WI 54107 Telephone: 715-758-2178 Fax: 715-758-2620
Ag Source Laboratories 300 Speedway Circle #2 Lincoln NE 68502 Tel: 402-476-0300 Fax: 402-476-0302	Waypoint Analytical Iowa, Inc. 111 Linn St., PO Box 455 Atlantic, IA 50022 Telephone: 901-213-2400 Fax: 901-213-2440	Brookside Lab Inc. 200 White Mountain Drive, New Bremen OH 45869 Telephone: 419-977-2766 Fax: 419-977-2767	
American Agricultural Lab 210 East First St, PO Box 370 McCook, NE 69001 Telephone: 308.345.3670 Fax: 308-345-7880	Ingram's Soil Testing Center 13343 Fitschen Road Athens, IL 62613 Tel: 217-636-7500 Fax: 217-636-7500	Spectrum Analytical 1087 Jamison Road, PO Box 639 Washington Court House, OH 43160 Telephone: 740-335-1562 Fax: 740-335-1104	

Note: Approval of soil analysis does not imply approval of fertilizer and limestone recommendations by the individual labs. The approval allows the clients to use the University of Missouri soil fertility recommendations as required by the federal and state agencies for cost share and nutrient management planning programs. In order to use the University of Missouri soil fertility recommendations and get meaningful results, it is recommended that the labs use the soil test procedures required by the MSTA program. 

Split Pits in Peaches

by Michele Warmund

This summer there has been an abundance of peaches with split pits. Split pits are openings at the end of the fruit where it was attached to the shoot. Peaches with split pits are easily recognized while on the tree because they are often larger and ripen earlier than those without this disorder. Fruit with split pits also have a shorter shelf-life and are prone to disease infection, especially in the flesh adjacent to the pit.



Stem cavity of a Redhaven peach exhibiting a split pit.

During the early development of the fruit, splitting occurs at two different times. The first time is at about 20 days after full bloom while the pit is still soft. However, the second splitting is considered to be the most damaging, which occurs later after pit hardening when the expanding flesh that is attached to the pit exerts enough force to cause the pit to break along its suture.

The occurrence of split pit is difficult to control. Generally, but not always, early-ripening cultivars are more likely to have split pits. However, this year about 25% of the Redhaven fruit produced at the Horticulture and Agroforestry Research Center near New Franklin, Missouri had split pits even though fruit of this cultivar ripens mid-season. Sub-freezing temperatures during flowering and early fruit development are often associated with split pits. Also, excessive rainfall near harvest also promotes split pits. In 2007, researchers found that two genes, PPERFUL and PPERSONSHP were expressed in peach during the period of fruit growth. Perhaps in the future these genes may be regulated to develop cultivars less prone to split pits. In the meantime, the selection of mid to late season ripening cultivars may be the best solution to avoiding fruit loss associated with split pits. 🌿

AUGUST GARDENING CALENDAR

Category	Week				Activity
	1	2	3	4	
Ornamentals	x	x	x	x	Continue spraying roses that are susceptible to black spot and other fungus diseases.
	x	x	x	x	Annuals may appear leggy and worn now. These can be cut back hard and fertilized to produce a new flush of bloom.
	x	x	x	x	Deadhead annuals and perennials as needed.
	x	x			Divide oriental poppies now.
	x	x			Feed mums, asters and other fall-blooming perennials for the last time.
	x	x			Roses should receive no further nitrogen fertilizer after August 15th.
	x	x			Powdery mildew on lilacs is unsightly, but causes no harm and rarely warrants control, though common rose fungicides will prove effective.
	x	x			Madonna lilies, bleeding heart (<i>Dicentra</i>) and bloodroot (<i>Sanguinaria</i>) can be divided and replanted.
	x	x			Divide bearded iris now. Discard old center sections and borer damaged parts. Replant so tops of rhizomes are just above ground level.
	x	x			Prune to shape hedges for the last time this season.
		x	x	x	Order bulbs now for fall planting.
		x	x	x	Evergreens can be planted or transplanted now to ensure good rooting before winter arrives. Water both the plant and the planting site several days before moving.
		x	x	x	If you want to grow big dahlia flowers, keep side shoots pinched off and plants watered and fertilized regularly.
Lawns	x	x			Zoysia lawns can receive their final fertilizer application now.
	x	x			Apply insecticides now for grub control on lawns being damaged by their activity.
			x	x	Lawns scheduled for renovation this fall should be killed with Roundup now. Have soil tested to determine fertility needs.
				x	Dormant lawns should be soaked now to encourage strong fall growth.
				x	Verify control of lawn white grubs from earlier insecticide applications.
Vegetables	x	x	x	x	Compost or till under residues from harvested crops.
	x	x	x		Sow seeds of beans, beets, spinach and turnips now for the fall garden. Spinach may germinate better if seeds are refrigerated for one week before planting.
	x	x	x		Cure onions in a warm, dry place for 2 weeks before storing.

Gardening Calendar supplied by the staff of the William T. Kemper Center for Home Gardening located at the Missouri Botanical Garden in St. Louis, Missouri. (www.GardeningHelp.org)

AUGUST GARDENING CALENDAR

Category	Week				Activity
	1	2	3	4	
	x				Broccoli, cabbage and cauliflower transplants should be set out now for the fall garden.
		x	x	x	Begin planting lettuce and radishes for fall now.
			x	x	Pinch the growing tips of gourds once adequate fruit set is achieved. This directs energy into ripening fruits, rather than vine production.
Fruits	x	x	x	x	Prop up branches of fruit trees that are threatening to break under the weight of a heavy crop.
	x	x	x		Protect ripening fruits from birds by covering plants with a netting.
	x	x	x		Continue to spray ripening fruits to prevent brown rot fungus.
	x				Thornless blackberries are ripening now.
		x	x	x	Watch for fall webworm activity now.
		x	x	x	Cultivate strawberries. Weed preventers can be applied immediately after fertilizing.
		x	x		Spray peach and other stone fruits now to protect against peach tree borers.
		x	x		Fall-bearing red raspberries are ripening now.
		x	x		Sprays will be necessary to protect late peaches from oriental fruit moth damage.
Miscellaneous	x	x	x	x	Soak shrubs periodically during dry spells with enough water to moisten the soil to a depth of 8-10 inches.
	x	x	x	x	Once bagworms reach full size, insecticides are ineffective. Pruning off and burning large bags provides better control.
	x	x			Spray black locust trees now to protect against damage by the locust borer.
		x	x	x	Hummingbirds are migrating through gardens now.
		x	x		Watch Scotch and Austrian pines now for Zimmerman pine moth damage. Yellowing or browning of branch tips and presence of pitch tubes near leaf whorls are indicative. Prune and destroy infected parts.
			x	x	Clean out cold frames to prepare for fall use.
			x	x	Monitor plants for spider mite activity. Hose these pests off with a forceful spray of water.
			x	x	2nd generation pine needle scale crawlers may be present on mugo pine now.

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