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MICHIGAN AGRICULTURAL COLLEGE

EXTENSION DIVISION

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Printed and distributed in furtherance of the purposes of the co-operative agricultural extension work provided for in the Act of Congress, May 8, 1914.
Michigan Agricultural College and U. S. Department of Agriculture co-operating.

BULLETIN No. 14

EXTENSION SERIES

MAY, 1918

SPRAY FORMULAS FOR THE HOME GARDEN.

This circular is written in response to the oft repeated question, "How shall I protect my small garden from insect and fungus enemies without preparing much more spraying or dusting material than I really require?"

Directions for preparing insecticides are to be found pretty well distributed over the state by now, but directions for preparing small amounts suitable for the protection of the plants in a little garden are not so easily to be found. The present circular aims to supply this demand. The formulas given below are in terms familiar to the housewife and are meant for those having a small patch of ground for garden purposes. In following the directions, one should, for the most part, use old dishes and these, when not in use, should be kept in a place by themselves so as not to be used for cooking purposes, and so that they will be ready when wanted.

MEASURES OF EQUIVALENTS FOR HOUSEHOLD USE.

2 cupfuls of liquid or dry material = 1 pint.
4 cupfuls of liquid or dry material = 1 quart.
3 teaspoonfuls = 1 tablespoonful.

*"Measurements by weight are the most accurate, but, as a pair of scales is not included in the kitchen outfits of all housekeepers, measurement by cup, table or teaspoon are usually designated. Measuring-cups hold half a pint and divisions into quarters and thirds are indicated on their sides."

To measure dry material, press the material into the cup or spoon solidly and level with a knife. All quantities call for level measurements.

KEROSENE EMULSION.

Standard formula:— Kerosene (coal oil) 2 gallons
Laundry soap 1 pound
Soft water 1 gallon
Dilute to required strength.

Household formula:—Kerosene (coal oil) 2 cupfuls (1 pt.)
Laundry soap 1 cubic inch
Soft water 1 cupful ($\frac{1}{2}$ pt.)
Dilute to required strength.

(For scale-insects, plant-lice, animal-lice, etc.)

*From "Cooking for Two" by Janet M. Hill. Little, Brown & Co.

From a cake of laundry soap cut out a cubic inch, that is, one inch each way. Shave it into a cupful of soft water and boil for a few minutes in a thick vessel which will hold the heat for a time. When dissolved remove from the fire and pour into it, while still hot, two cupfuls of kerosene oil. Agitate violently with an egg-beater until the oil is perfectly emulsified, when it will have a creamy appearance and will not readily separate from the water if allowed to stand. Or in place of an egg-beater one can pour the mixture into a two-quart fruit-jar and vigorously shake it, with an up and down motion, until the mixture is completely emulsified which should require at least ten minutes. This is known as the stock emulsion and *must* be diluted before using. For use as a dormant or winter spray against scale-insects it should be diluted at the rate of one part of the stock emulsion to 3 or 4 parts of water, or in other words, mix one cupful of the stock emulsion in a quart of water. For plant-lice or lice on domesticated animals it should be diluted at the rate of one part of the stock emulsion to 10-15 parts of water or mix one cupful of the stock emulsion in three quarts of water. This more dilute spray should be used if there are any leaves on the plant to be sprayed, and in all cases the spray mixture should be kept stirred or shaken while applying. If this is not done a good mixture is not maintained, which may result in burning the leaves. If hard water is used in making the emulsion, much better results will be had if a little washing soda is added. It is best to apply this spray on bright sunshiny days when the moisture in the spray will evaporate quickly. It is a contact spray and kills by hitting the insect, so that a thorough job is necessary. If any of the stock emulsion is left it can be kept for some time in an air-tight fruit-jar, which should be labeled and put away for future use.

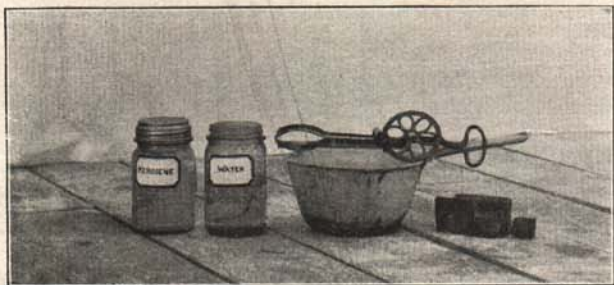


Fig. 1. Materials for making kerosene-emulsion.

NICOTINE.

Standard formula:—	Nicotine sulphate (40%)	1 pint
	Soap	4 pounds
	Water	100 gallons
Household formula:—	Nicotine sulphate (40%)	1 teaspoonful
	Soap	1 cubic inch
	Water	3 quarts

(For plant-lice, white-fly, etc.)

Into one quart of warm water shave one cubic inch of common laundry soap and when dissolved pour it into two quarts of water and add a teaspoonful of nicotine sulphate, 40%. Shake well to get a good mixture and it is ready for instant use. Care should be taken to get nicotine sulphate of the proper strength, 40%, for if a weaker solution should be used it will make the spray too weak to be effectual.

Nicotine sulphate can be purchased at many drug or hardware stores or wherever spray materials are sold. This spray seems to have taken the place of kerosene emulsion, to a great extent, as a contact spray. It is very effective and easy to prepare. It should be applied liberally so as to drench the plants to be protected.

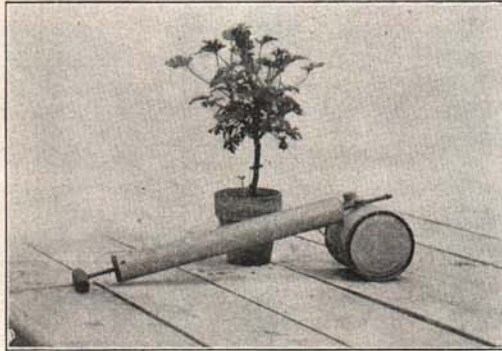


Fig. 2. An atomizer for applying small quantities of liquid sprays.

PYRETHRUM.

Standard formula:—	Pyrethrum	1 ounce
	Water	2 gallons
Household formula:—	Pyrethrum	2 teaspoonfuls
	Water	1 quart

(For cabbage-worms, etc.)

Pyrethrum is usually applied as a powder, dusted on the plant, either alone or mixed with lime or sulphur. Another equally good way is to use it as a spray. Into a quart of water add two teaspoonfuls of pyrethrum and stir well, it will not dissolve but will remain in suspension. It kills insects through their breathing-pores but is harmless to man. Care should be taken to use fresh pyrethrum or else good results cannot be expected. It should be purchased from air-tight packages and kept in a tightly closed fruit-jar if it is not all immediately used.

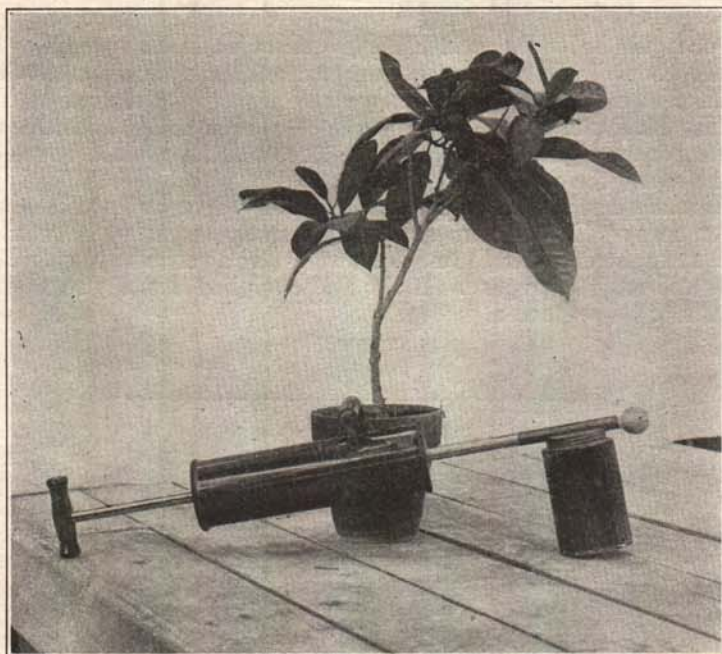


Fig. 3. A small dust-gun capable of applying all the dust treatments in an ordinary garden.

ARSENATE OF LEAD.

Standard formula:—	Arsenate of lead (powdered)	1½ pounds
	(or arsenate of lead paste)	3 pounds)
	Water	50 gallons
Household formula:—	Arsenate of lead (powdered)	3 tablespoonfuls
	(or arsenate of lead paste)	1 tablespoonful)
	Water	1 gallon

(For codling-moth, caterpillars on plants, flea beetles, and other chewing insects.)

Measure into a cup three tablespoonfuls of powdered arsenate of lead and fill the cup about two-thirds full of water. With a spoon mix these so that a good paste is formed and then add enough water to make four quarts of poison. This will be strong enough for most of the chewing insects but for the more resistant ones such as the potato beetles it will be more effective to use twice as much of the arsenate of lead, or six tablespoonfuls to a gallon of water. Bordeaux mixture can be used in place of the water if it is desired. If arsenate of lead paste is used it will require twice as much, by weight, as the powdered form. The powdered arsenate of lead is much lighter than the paste of the same bulk so that apparently more of the powder is being used.

Arsenate of lead has many advantages over Paris green, inasmuch, as it will stick to the foliage much better and will not easily wash off. Also it will

not be as likely to injure the foliage and can safely be used in combination with lime-sulphur sprays.

Arsenate of lead is also applied in the form of a dust when it is mixed with either air-slacked lime or sulphur and applied with a specially constructed dust-gun or else dusted on.

POISON BRAN-MASH.

Standard formula:—	Bran	20 pounds
	Paris green	1 pound
	Molasses	2 quarts
	Oranges	3 (chopped fine)
	Water	To make a good mash
Household formula:—	Bran	1 quart
	Paris green or white arsenic	1 teaspoonful
	Molasses	3 tablespoonfuls
	Orange	$\frac{1}{4}$ (chopped fine)
	Water	To make a good mash
	Purple dye	1 saltspoonful

(For grasshoppers, army-worms, cut-worms, garden slugs, sow-bugs, etc.)

Add a teaspoonful of Paris green or white arsenic to a quart of bran and mix well together. Put three tablespoonfuls of molasses into a cup of water, stirring it well together and add to the bran, working it in. Put a quarter of an orange or half a lemon through the grinder and add to the bran mixture. Then add enough water to make a good stiff mash, and add a small amount of diamond dye (purple) to serve as a good warning color. A teaspoonful of this mixture scattered near the base of the plants to be protected will give the required results. It may also be broad-casted. To get the best results from this mixture, it should be put out in the evening so that it will remain fresh all night. Care should be taken not to allow poultry to run where this is being used.

POISONED BAIT FOR ROOT-MAGGOTS.

Root-maggots in Michigan can be classed under three species, namely, the one affecting beans and seed-corn, the one on onions, and the one on cabbages, radishes, turnips, etc. The adults of these maggots are small flies about two-thirds the size of house-flies. And like house-flies they are lovers of sweets. The State Entomologist of Wisconsin has developed an effective bait for controlling the maggots of onion, and also the one of cabbage and radish. This is used in the form of a poisoned syrup, which is exposed in a small basin placed on the ground near the plants to be protected. The syrup is made by dissolving 5 grams of sodium arsenite in a gallon of hot water and adding half a pint of New Orleans molasses, with a small amount of purple coloring matter—such as the purple dye put out as one of the diamond dyes. This is to serve as a warning color. A gallon is enough to treat any ordinary garden. Fifteen or twenty of these pans are used to the acre. After the poison is placed in the pans it should be covered with a wire screen having a mesh too small to allow bees to enter and large enough to accommodate the flies.

While this is a good poison to use, it has not been used very extensively on account of the inability of many to procure the sodium arsenite. This

poison can be made at home as follows: Boil in an old kettle one-half pound of commercial white arsenic and two pounds of sal soda (washing soda) in one-half gallon of boiling water. (Same as Kedzie Mixture stock solution without the lime).

Two tablespoonfuls of this arsenite of soda solution are equivalent to 5 grams of the powdered form. In order to make the poison bait for root-maggots, take two tablespoonfuls of the solution and add to one gallon of water and a pint of molasses.

CAUTION.

It is impossible to exercise too much care in avoiding accidents which may attend the use of violent poisons in the garden or in storing these poisons about the house or barn. Any poison that is left over after making an application of a spray or dust, should be placed out of the reach of children or other irresponsible people. We recommend the addition of a little purple aniline (in the form of diamond dyes) to home-made spray mixtures and powders, hoping that the purple will serve as a warning color and thus prevent mistaking the poison for baking powder or anything else of the kind.

If these precautions cannot be observed religiously and to the letter it will be far better to discard them and trust to other means in controlling the pests.

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