

TEXAS AGRICULTURAL EXPERIMENT STATIONS.

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BULLETIN NO. 113.

AUGUST, 1908.

# SPRAY CALENDAR

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POSTOFFICE:

COLLEGE STATION, BRAZOS COUNTY, TEXAS.

AUSTIN:

VON BOECKMANN-JONES COMPANY, PRINTERS  
1908.

# TEXAS AGRICULTURAL EXPERIMENT STATIONS

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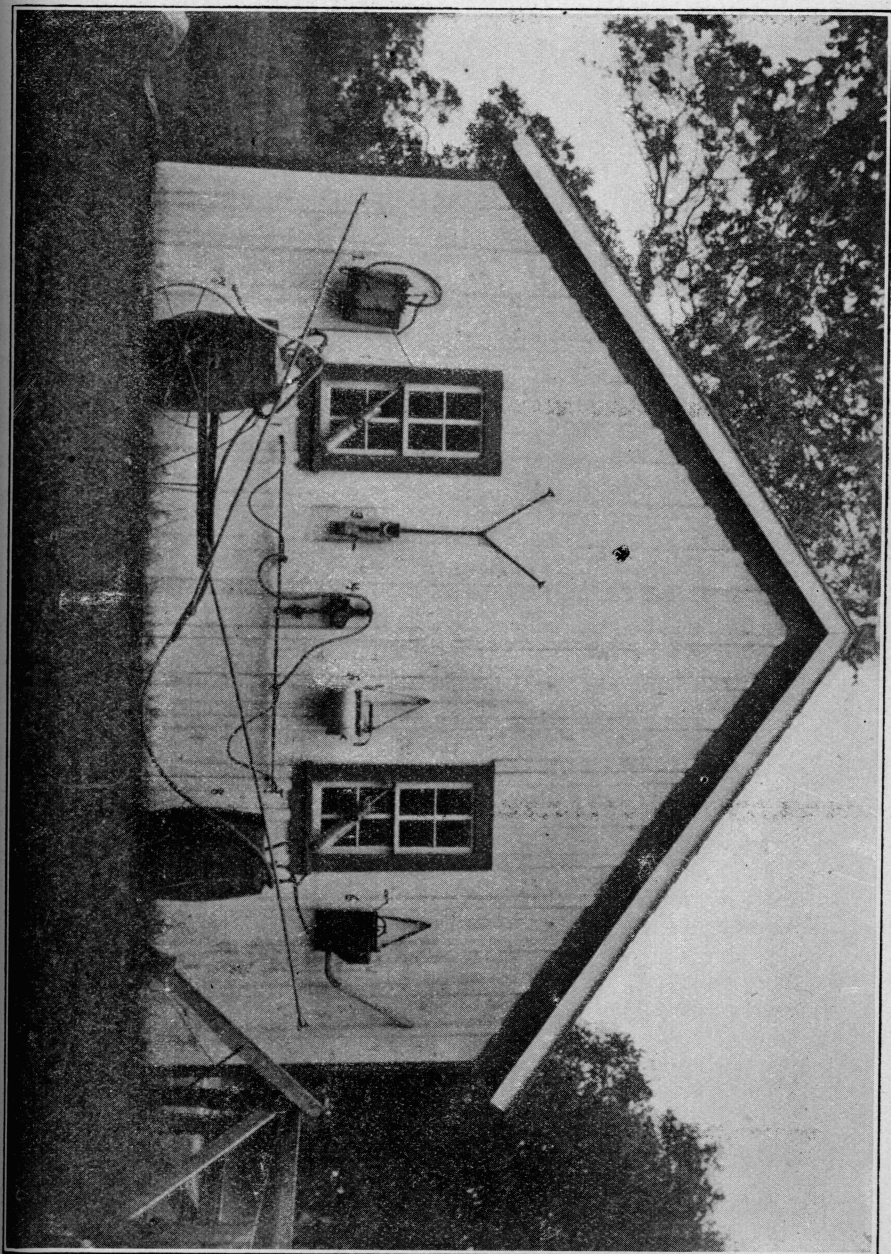
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NOTE.—*The main station is located on the grounds of the Agricultural and Mechanical College, in Brazos county. The postoffice address is College Station, Texas. Reports and bulletins are sent free upon application to the Director.*

SOME GOOD TYPES OF SPRAY MACHINERY.



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## A FEW WORDS CONCERNING SPRAYING MACHINERY.

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The frontispiece of this bulletin is intended to aid inexperienced parties in selecting spray machinery, who might not otherwise know what would be best suited for their conditions.

For an ordinary "vest pocket" gardener, I advise the use of a compressed air sprayer. (See frontispiece, Figure 5.) This sprayer is made ready for spraying by means of an attached air pump, with which the operator compresses air in the tank after placing therein the spray liquid. He then has nothing to do except direct the spray. This machine is very convenient for many other purposes than truck and garden, since it can conveniently be used for spraying cats, dogs, poultry, cows, horses, and sprinkling halls, etc. The knapsack spray pump, Figure 1, may also be used with equal success on small gardens, shrubbery, etc., and is used considerably in large gardens. Constant pumping is required by the operator in the use of this machine. Either one of these sprayers is very convenient for use by parties who own larger spraying apparatus, since many times an insect outbreak occurs on a small area that is inconvenient of access to the larger machines. Figure 5 retails at about \$3.50 and Figure 1 at from \$10 to \$15.

Figures 3 and 6 represent two types of sprayers for distributing such insecticides as Paris green, powdered lead arsenate, insect powder, sulphur, hydrated lime, etc., in dry form. Figure 3 has an adjustable tube by which two rows of potatoes or similar truck may be sprayed at the same time. Figure 6 is used for similar purposes. These instruments retail at from \$5.50 to about \$12 apiece, respectively. Special dusting machines are also made for large field and orchard work.

The barrel spray pumps, Figures 7 and 8, are used not only in small and large orchards, but also in fields. Figure 7 is a very handy article for the smaller orchards, and desirable by those who have no team and wagon for carrying the apparatus. It is convenient for spraying shade trees, bushes, and truck patches. This barrel can be easily removed from its trucks and carried on a wagon.

Figure 4 is known as a "Row" or "Field Crop Sprayer." It is mounted by means of a clamp, which can be attached to the rear end of a wagon bed. Several rows of field plants may be sprayed with it in one operation, since its adjustable spray nozzles (the number is optional with the purchaser) can be conveniently arranged so that the spray may issue as desired.

Figure 2 represents a type of cheap and very convenient emulsion pump, which is used in the preparation of emulsion formulæ.

For general all-round spraying such as the ordinary nurseryman, orchardist, and trucker has, I advise the use of the "barrel" and "row" spray pump outfit. The barrel with hose and extension rods mounted on a wagon, may be used for trees. The same barrel and wagon may be used in connection with the adjustable "row" sprayer for truck and field

crops. Barrel spray pumps retail at from \$10 to \$20. Field crop sprayers retail at from \$10 to \$25.

*Spray Nozzles.*—For general work the Vermorel or Mistry nozzles are highly recommended. For the field crop sprayer the "Seneca" nozzle, which can be used to throw a fan-shaped spray, is often quite desirable.

#### ADDRESSES OF SPRAY MACHINERY COMPANIES.

For addresses of reliable manufacturers and dealers of spray machinery, I refer interested parties to their local dealers or to their leading farm, truck, and horticultural journals.

#### FORMULAE.

Oftentimes an insect outbreak occurs and serious results follow so rapidly that it is impractical to wait from two or three days to a week in order to find out what kind of a remedy should be used. By consulting the following directions and formulæ, a remedy can be readily concocted for nearly all of our prevalent injurious insects:

#### ARSENICAL SPRAYS OR SPRAYS FOR LEAF-EATING INSECTS.

##### I. ARSENATE OF LEAD.

(Mild spray for fruit or nut-bearing trees.)

Arsenate of lead.....	1½ lbs.
Water . . . . .	50 gals.

Dissolve the arsenate of lead in a small quantity of the water, then strain into the remainder of the water.

##### II. ARSENATE OF LEAD.

(Strong spray for leaf-eating insects disseminating into fields.)

Arsenate of lead.....	3 or 4 lbs.
Water . . . . .	50 gals.

##### III. PARIS GREEN.

(Mild spray for orchards and shrubs affected with leaf-eating insects.)

Paris green . . . . .	5 ozs. or ½ lb.
Lime . . . . .	1 lb.
Water . . . . .	50 gals.

Dissolve the Paris green and lime in a small quantity of the water and strain it into the remainder of the water.

##### IV. PARIS GREEN.

(Strong spray for potato and other similar vines; also weed patches, from which insects are disseminating.)

Paris green . . . . .	1 lb.
Lime . . . . .	2 lbs.
Water . . . . .	50 gals.

V. LONDON PURPLE.

(Used for same purposes and applied same as Paris green. Results on plants are sometimes caustic. As a partial remedy against a probable caustic effect, use about five times as much lime as London purple.)

DUST SPRAYS.

It is often convenient to use such chemicals as powdered lead arsenate, Paris green, green arsenoid, or London purple and similar articles without addition of water. The results are equally effective if the poisons are caused to adhere to the plant. In order to aid this desirable adhesiveness, dust chemicals should be applied while the foliage is damp, i. e., while the dew is on or after a shower, and while the atmosphere is calm.

Apply these with a dust machine at the rate of 1 pound per acre on short foliage, such as cotton six inches high or less. And use 2 pounds per acre on such a plant taller than six inches.

When used roughly without a machine, use same amount mixed with 10 to 20 pounds hydrated lime or similar substance.

For use in checking dissemination of insect from weed patches, etc., no lime need be added, since a slight burning of the foliage is of no consequence.

VI. BORDEAUX MIXTURE WITH ARSENICAL.

Copper sulphate . . . . .	3 lbs.
Lime (unslaked) . . . . .	5 lbs.
Lead arsenate . . . . .	2 lbs.
Water . . . . .	50 gals.

Place copper sulphate in a sack and submerge in three or four gallons of the water. At same time allow lime to slake in four or five gallons of the water. Mix lead arsenate into a paste with water in a third vessel. The next day strain all simultaneously into the remainder of fifty gallons of water. To be used on diseased potato or other similar hardy plants that are also infested with leaf-eating insects.

Do not use this on stone fruit trees in foliage. Too much depends upon the weather as to probable results.\* As a fungicide or disease-destroyer, the formula can be used under the same conditions without the addition of arsenate of lead.

VII. POISONED BRAN MASH.

Wheat bran . . . . .	25 lbs.
White arsenic . . . . .	1 lb.
Molasses . . . . .	2 qts.

Mix the bran and arsenic, dilute the molasses with one-half gallon of warm water; pour this into a vessel containing the bran and arsenic

\*In a former spray calendar (Circular No. 10) issued by this department is designated a "Bordeaux Mixture" for stone fruits. To this the following phrase should be added: "Not to be used on the trees while in foliage."

and mix thoroughly. Add enough water to make a stiff mash. To be used for killing such insects as grasshoppers while crossing barren places, or in early spring before vegetation is abundant.

CONTACT SPRAYS, EMULSIONS, DUST SPRAYS, ETC., NOT NECESSARILY POISONOUS.

#### VIII. LIME SULPHUR.

Lime . . . . .	20 lbs.
Sulphur . . . . .	16 lbs.
Water . . . . .	50 gals.

Mix the sulphur into a paste with some of the water; add about fifteen gallons of the boiling water, then add the lime and stir thoroughly; continue boiling until bright yellow color of sulphur disappears. The color should then be a rich amber. Time of boiling should be about three-quarters of an hour.

This is for application to dormant trees infected with San Jose or similar scales. It is also a good fungicide and has bad effect on overwintering eggs, such as those of aphids, and pupa, such as those of the pecan bud worm.

#### IX. KEROSENE EMULSION.

Hard soap . . . . .	$\frac{1}{2}$ lb.
Boiling soft water . . . . .	1 gal.
Kerosene . . . . .	2 gals.

Shave the soap fine and thoroughly dissolve in the boiling water; add the two gallons of kerosene, away from the fire. Thoroughly emulsify by pumping or churning it. (See pump, Figure 7, frontispiece.) When properly emulsified it should be of the consistency of cream and noticeably increased in bulk. Should be diluted at the rate of one gallon to ten or fifteen of soft water.

For use in controlling sucking insects such as plant lice, leaf hoppers, young squash and harlequin bugs; and in fact nearly all insects that cannot be controlled with an arsenical. Used in the summer time while the foliage is on the tree. Has bad effect on scale insects infesting citrus trees. Also used for subjecting thrips and other similar small insects on truck crops.

#### X. WHALE OIL SOAP EMULSION (STRONG SOLUTION).

Whale oil soap . . . . .	2 lbs.
Water . . . . .	1 gal.

Dissolve soap in hot soft water. Apply to trunk and branches of trees infested with scales.

#### XI. WHALE OIL SOAP EMULSION (MILD SOLUTION).

Whale oil soap . . . . .	1 lb.
Water . . . . .	6 gals.

Spray foliage affected with scales, plant lice, mites, thrips, etc.



XII. GAS TAR.

Preventive of peach tree borer. Paint tree trunk to half an inch below surface of oil.

XIII. GASOLINE (A CHEAP GRADE).

Spray undiluted on blister beetles or similar insects when they are in droves or colonies. Use a very fine spray nozzle.\*

XIV. ZENOLIUM.

Zenolium . . . . .	1 pint.
Water . . . . .	25 gals.

Zenolium is a disinfectant and insect repellant.

Above formula is a  $\frac{1}{2}$  per cent solution. This can be used for bathing or spraying dogs and cats infested with fleas. A 4 per cent solution can be used for spraying the premises to eliminate fleas, mites, and other similar obnoxious pests. If sprayed beneath and on the foundation of houses infested with fleas, it will give satisfaction. It is a good article to spray on barnyards, cow lots, pig pens, and in poultry houses.

XV. HYDRATED LIME.

Used largely as a repellant on cucumber and young melon vines to eliminate ravages of cucumber beetles, etc. Apply same as poisonous dust spray. Color the plants with it.

XVI. SULPHUR.

Good to use in poultry houses, yards, barns, etc.; also on vegetation affected with mites or spiders. Use copiously.

POISONOUS GASES.

XVII. HYDROCYANIC ACID GAS.

Used in killing insects injurious to stored grain or other products:

Cyanide of potassium . . . . .	1 oz.
Sulphuric acid . . . . .	2 oz.
Water . . . . .	4 oz.

Should be used in air-tight enclosures. For generating, place water in an earthenware vessel, add the sulphuric acid, then the cyanide of potassium, then hasten from the room. Fumes are deadly poisonous to animal life. Subject the latter to it for at least an hour, after which open ventilators and allow the gas to escape.

The measure in this formula is for 100 cubic feet of space. It is used for killing insects in stored grain, or other insects found under similar conditions.

\*Mr. A. P. Borden of Pierce, Texas, advises the use of this spray in eradicating blister beetles in alfalfa fields. If properly used, it is efficient.



This gas is also used in fumigating orchards and nursery stock. The latter while placed in a fumigating house. Special directions for such work cannot be given here.

Cyanide of potassium is a deadly poison and should not only be used with caution, but, if kept on the premises, it should be carefully sealed and labeled.

### XVIII. CARBON BISULPHIDE OR "HIGH LIFE."

Used in killing insects injurious to stored grain or other products.

For use in air-tight enclosures at the rate of 1 pound to 1000 cubic feet of space, or 1 pound to the 100 bushels of grain. Place necessary amount in shallow pans under desired conditions and allow five hours for results in hot weather. This liquid in order to give the best results ought to evaporate rapidly, but should not be allowed to come in contact with fire, as it is explosive. If used on a cool day, place containers on warm bricks. In addition to the fire caution, use same precautions as with hydrocyanic acid gas.

This gas is also used in killing ants, gophers, ground squirrels and similar pests that have subterranean habits.

To eradicate an ordinary sized nest of red ants, pour 3 ounces of the liquid into a shallow pan; place near entrance hole; cover with a tub by inverting it over pan and entrance hole; mound the soil up around edges of tub and close any nearby holes that may not be covered by the tub. Apply when the earth is warm and moist.

### XIX. TRAP LIGHTS.

Nocturnal insects, such as June bugs and other beetles, also millers and many of the smaller insects, are attracted to lights on warm muggy nights. If lights are placed over barrels or tubs of water with a pint of kerosene on the surface, these insects flying to the light, will be killed by dropping into the liquid.

### XX. HYPOSULPHITE OF SODA (E. S. TUCKER'S FORMULA).

(For "Red Bugs" or "Chiggers.")

Hyposulphite . . . . .	1 oz.
Water . . . . .	5 oz.

Apply as a liniment to infested part of the body. Used similarly also as a repellent before going to the woods or pastures where chiggers may be present.

### XXI. INSECT OR BUHACH POWDER.

For ants or roaches, dust the powder copiously in cracks and crevices used by them. For ants which enter cupboards, or collect on tables or refrigerators from some "unknown source," encircle the supports or legs with a narrow band of fluffy cotton thoroughly dusted with this powder.

In addition to the formulæ given herein, there are many proprietary remedies on the market which are very effective.