This issue of the "Vegetarian", as was issue No. 3 on insect control, was prepared from the manuscript of the revised Handbook on Pesticides and Their Uses in Florida Agriculture to be released at a later date.

We have drawn freely upon the recommendations of Florida Agricultural Experiment Station entomologists and pathologists and are indeed grateful for their cooperation in getting this information to you as soon as it is available.

**CODE NAMES:**
- Nabam (27%)
- Ziram (76%)
- Thiram (50%)
- Zineb (65%)
- Ferbam (76%)

**ACTIVE PRINCIPLE:**
- disodium ethylene bisdithiocarbamate
- zinc dimethyl dithiocarbamate
- tetramethyl thiuram disulfide
- zinc ethylene bisdithiocarbamate
- ferric dimethyl dithiocarbamate

### DUST TREATMENTS FOR PREVENTING SEED DECAY AND IMPROVING STAND

<table>
<thead>
<tr>
<th>Crop</th>
<th>Materials</th>
<th>OZ.</th>
<th>Tspns.</th>
<th>100#</th>
<th>1#</th>
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<tbody>
<tr>
<td>Bean, lima</td>
<td>Spergon 48%</td>
<td>4</td>
<td>1/4</td>
<td>6</td>
<td>1/4</td>
</tr>
<tr>
<td></td>
<td>Thiram 50%</td>
<td>2</td>
<td>1/2</td>
<td>8</td>
<td>1/2</td>
</tr>
<tr>
<td>Bean, snap</td>
<td>(same as for lima)</td>
<td>8</td>
<td>1/4</td>
<td>12</td>
<td>1/4</td>
</tr>
<tr>
<td>Beet</td>
<td>Thiram 50%</td>
<td>8</td>
<td>1</td>
<td>12</td>
<td>1/3</td>
</tr>
<tr>
<td></td>
<td>N.I.Ceresan 5%</td>
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<td>3/4</td>
<td>12</td>
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<tr>
<td>Broccoli</td>
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<td>1/2</td>
<td>12</td>
<td>1/3</td>
</tr>
<tr>
<td></td>
<td>Zineb 30%</td>
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<td>1/3</td>
<td>12</td>
<td>1/3</td>
</tr>
<tr>
<td>Brussel sprouts</td>
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<td>1/3</td>
<td>12</td>
<td>1/3</td>
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<tr>
<td></td>
<td>English Pea</td>
<td>6</td>
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<tr>
<td></td>
<td>Thiram 50%</td>
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<td>1</td>
<td>12</td>
<td>1/3</td>
</tr>
<tr>
<td>Cabbage</td>
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<td>12</td>
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<tr>
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<td>Pepper</td>
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<td>12</td>
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</tr>
<tr>
<td></td>
<td>Zineb 30%</td>
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<td>1/3</td>
<td>12</td>
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</tr>
<tr>
<td>Cauliflower</td>
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<td>12</td>
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<tr>
<td></td>
<td>Zineb 30%</td>
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<tr>
<td>Celery</td>
<td>Cuprooxide 80%</td>
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<td>Spergon 48%</td>
<td>12</td>
<td>1/3</td>
<td>12</td>
<td>1/3</td>
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<tr>
<td>Cucumber</td>
<td>Thiram 50%</td>
<td>3</td>
<td>1/3</td>
<td>6</td>
<td>1/3</td>
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<tr>
<td></td>
<td>Zineb 30%</td>
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<td>1/3</td>
<td>6</td>
<td>1/3</td>
</tr>
<tr>
<td></td>
<td>Watermelon</td>
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<td>1</td>
<td>12</td>
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<tr>
<td></td>
<td>Thiram 50%</td>
<td>6</td>
<td>1</td>
<td>12</td>
<td>1/3</td>
</tr>
</tbody>
</table>

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*August 10, 1950*
BEANS, SNAP

Rust and Powdery Mildew

- Wettable Sulfur - 10 to 16 lbs./100 gal.
- or Dusting Sulfur - 325 mesh

Frequency of application is variable with weather conditions. When young plants are near diseased fields, and the weather is mild and humid, make the first application a few days after the plants emerge. Repeat at 7-day intervals until a few days before picking. Increase intervals when weather is unfavorable for rust.

Blossom-drop caused by sulfur is considered to be of minor importance. For effective rust control apply sulfur before the leaves become heavily infected.

Certain varieties are highly resistant to some forms of rust and should be used where advisable.

On the West Coast 16 lbs. per 100 gal. gives best results. These materials are compatible with recommended insecticides.

Bacterial Blights

No fungicidal control.

Haloblight and common bacterial blight are carried in and on the seed. No seed treatment is beneficial and sprays in the field are usually not effective. Use clean seed. Rotate crops.

BEANS, POLE

Diseases and controls are the same as for snap beans. However, since pole beans have indeterminate growth it may be profitable to continue applications until about the end of harvest.

CABBAGE-Seedbed

- Downy Mildew
- Alternaria Leaf Spot

Wettable Spergon 40% - 1 lb./100 gal.
or
12% Spergon Dust

Begin applications 7 to 10 days after planting and repeat three times a week until plants are set in the field.

Plants are susceptible to both diseases at all stages of growth, but downy mildew is more common and destructive in the seedbed. Use spergon in the seedbed as it gives better control of mildew.

Total number of applications may vary from 6 to 15 depending upon the season and weather. The amount of spray or dust varies also with size of the plant. These materials are compatible with TEPP, parathion, DDT and chlordane.

CABBAGE-Field

- Downy Mildew
- Alternaria Leaf Spot

Nabam (27%) - 2 qts. plus 1 lb. zinc sulfate /100 gals.

Where seed is sown directly in the field spray seedlings 2 to 3 times a week, beginning when seedlings have emerged and stopping when plants are thinned to a stand. If alternaria leaf spot is developing rapidly when heads
are half grown resume spraying and using 100 to 150 gallons spray per acre every 4 or 5 days.

Nabam is very effective against alternaria leaf spot in the field and gives good control of downy mildew. It is recommended for use in the field because it is cheaper than spergon. Use 2 to 3 ounces of spreader-sticker per 100 gal. Nabam is compatible with TEPP, parathion, DDT and chlordane.

Black Rot

Hot Water Treatment - 122°F. for 25 minutes.

Fill cheesecloth bags about two-thirds full of seed, tie the tops, and immerse in a container of water at the temperature indicated. Keep the water within 1° of that specified. Keep the seed underwater and stir to remove air. At the end of the period remove seed from the hot water and plunge into cold water---spread out and dry.

Test seed for germination before treating with hot water. Weak seed may be killed while good seed will stand treatment and germinate well if planted the same season it is treated. Rotate crops. Seed grown in the Puget Sound area do not need treatment.

Black Leg

Same treatment as black rot above.

Use seed grown in areas where black leg does not usually occur, such as the Puget Sound area. When in doubt of seed source---treat.

CAULIFLOWER AND BROCCOLI

Black Rot

Downy Mildew

Alternaria Leaf Spot

Same controls as cabbage above but limit hot water treatment to 18 minutes.

CARROT

Macrosorium Leaf Blight

Nabam (27%) - 2 qts. plus 1 lb. zinc sulfate/100 gal.
Bordeaux - 5-5-50
Ziram (76%) - 2 lbs./100 gal.

Begin applications when plants are 5 to 8 inches high and repeat at weekly intervals. Leaf blights of carrot are serious in some localities and of minor importance in other seasons or localities.

These materials are compatible with insecticides recommended.

Bacterial Blight

Corrosive Sublimate 1:1000 - 1 oz. crystals/7½ gal. water for 10 minutes

Hot Water Treatment - 10 minutes in water at 126°F.

After treatment, wash and dry seed.

CELERY-Seedbed

Damping-off

Spergon (48%) - 3 lbs./100 gal.
Thiram (50%) - 1 lb./100 gal.
Begin applications soon after plants emerge and repeat at 4 to 7-day intervals depending on weather. After first three applications change from 3 lbs. spergon to 4 lbs./100 gal.
Both materials are compatible with DDT and BHC.

**CELERY-Field**

**Early Blight**

<table>
<thead>
<tr>
<th>Material</th>
<th>Application</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nabam (27%)</td>
<td>2 qts. plus 1 lb. zinc sulfate/100 gal.</td>
</tr>
<tr>
<td>Zineb (65%)</td>
<td>2 lb./100 gal.</td>
</tr>
<tr>
<td>Ferbam (76%)</td>
<td>2 lb./100 gal.</td>
</tr>
<tr>
<td>Ziram (76%)</td>
<td>2 lb./100 gal.</td>
</tr>
<tr>
<td>Forms of copper that have proved satisfactory</td>
<td>1½ lbs. metallic copper/100 gallons.</td>
</tr>
</tbody>
</table>

In the Everglades area begin applications 7 to 10 days after plants are set in field and repeat at 4 to 5-day intervals. After two applications of any of the other material indicated follow with one application of copper. Nabam gives best results there.

In the Sanford area apply at weekly intervals unless more frequent applications should be made. Ferbam, ziram and coppers have given best results in the Sanford area. All are compatible with DDT and BHC.

**CANTALOUPE**

**Downy Mildew**

**and**

**Powdery Mildew**

Same as for cucumber below.

**CUCUMBER**

**Downy Mildew**

<table>
<thead>
<tr>
<th>Material</th>
<th>Application</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nabam (27%)</td>
<td>2 qts. plus 1 lb. zinc sulfate/100 gal.</td>
</tr>
<tr>
<td>Zineb (65%)</td>
<td>½% dust in suitable diluent</td>
</tr>
</tbody>
</table>

First applications should be made when runners begin to form. Repeat at weekly intervals until harvest.

Downy mildew is usually serious in all sections of the state when weather conditions favor its spread and development. In some years it starts before runners begin to appear in which case the first application should be made earlier and the frequency of applications are determined by weather conditions. Powdery mildew is of minor importance in most seasons and does not require separate treatment for its control.

These materials are compatible with recommended insecticides.

**Angular Leaf Spot**

<table>
<thead>
<tr>
<th>Material</th>
<th>Application</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corrosive Sublimate</td>
<td>1 oz. crystals/7½ gal. water.</td>
</tr>
</tbody>
</table>

Use disease-free seed
Treat seed in the 1:1000 solution above for 5 minutes then rinse in clean water and spread out to dry.
Angular leaf spot does not often occur in the state because seed are produced in areas where the disease usually does not occur.

**Powdery Mildew**

- Zineb (65%) - 4% dust in suitable diluent
- Ferbam (76%) - 7% dust in suitable diluent

Apply when runners begin to form and repeat at weekly intervals until harvest.
These materials are compatible with recommended insecticides.

**EGGPLANT**

**Phomopsis (tip-over)**

No fungicidal control.
Resistant varieties are Florida Market and Florida Beauty.

**ENGLISH PEAS**

- Powdery Mildew
  - Wettable Sulfur - 10 lbs./100 gal. plus wetting agent.
  - Sulfur Dust - 325 mesh

Begin when signs of disease appear. Repeat at 10 to 14-day intervals, or often enough to keep the disease under control.

Powdery mildew sometimes becomes serious during the winter months in the Everglades area where most of the peas are grown on a commercial scale. In this locality it is usually necessary to adhere to a strict spray program to keep it under control.
These materials are compatible with insecticides recommended.

**FROG-EYE SPOT**

**PEPPER**

- Ziram (76%) - 2 lbs./100 gal.
- Natam (27%) - 2 qts. plus 1 lb. zinc sulfate/100 gal.

Forms of copper that have proved satisfactory - diluted to give metallic copper content of 1½ lbs./100 gal.

In plant beds, begin when plants are 2 to 3 inches high and repeat at 7-day intervals; in fields after plants have become established repeat at 7 to 10-day intervals.

Frogeye spot does not always occur in serious form every year. When weather conditions are not favorable the spray schedule may be modified.
These materials are compatible with isox, DDT, wettable and emulsion.
Bacterial Spot

Forms of copper that have proved satisfactory - Diluted to give metallic copper content of \( \frac{1}{2} \) lbs./100 gal.

Application and compatibility same as under frogeye spot.

Bacterial spot is usually most severe during or following rainy, windy weather. Where it occurs with frogeye and Alternaria spot the same schedule should take care of all diseases.

IRISH POTATO

Late Blight

<table>
<thead>
<tr>
<th>Product</th>
<th>Application</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nabam (27%)</td>
<td>2 qts. plus 1 lb. zinc sulfate/100 gal.</td>
</tr>
<tr>
<td>Zineb (65%)</td>
<td>2 lbs./100 gal.</td>
</tr>
</tbody>
</table>

Forms of copper that proved satisfactory - Diluted to give metallic copper content of \( \frac{1}{2} \) lbs./100 gal.

In Southern parts of the state begin applications when plants have emerged and continue at 4 to 5-day intervals. In the Hastings area begin when the plants are 6 to 8 inches high if late blight does not show earlier and continue at 4 to 5-day intervals.

If cutworms, Colorado potato beetles and aphids are present use DDT in each application of fungicide. At Belle Glade and Homestead late blight is usually present throughout the growing season and nothing less than the best fungicide applied on rigid schedule gives satisfactory control. In the Hastings area copper dusts have controlled late blight when applied properly. Nabam and zineb are compatible with DDT, wettable and emulsion.

Early Blight

Materials and formulas are the same as for late blight above.

Use schedule for late blight where both early and late blight are present. Less frequent applications may be used where late blight is not serious.

Early blight is usually important in the Southern part of the state and the schedule for late blight gives good control. In the Hastings area and other sections it is usually not of sufficient importance to spray for early blight alone.

Copper fungicides are not as good as nabam and zineb.

Scab

(Use of treatments is not recommended in the Hastings area and other parts of the state where scab is of minor importance.)

Cold Formaldehyde - 1 pt. 40% in 30 gal. water

Soak uncut tubers 1\( \frac{1}{2} \) hours then remove and air out thoroughly. This treatment is more effective when sacked tubers are first soaked in water for 2 minutes before soaking them in formaldehyde or mercury solutions. This softens the scab lesions.

Hot Formaldehyde - 3.3 qts. 40% /100 gal.

Dip uncut sacked tubers for 3 to 4 minutes in the solution held at 122° to 124°F. Stack sacks on end for one hour, one layer deep, to drip and air out.
Potatoes may be cut for planting any time after the sacks have dried. Temperature of the hot solution must be kept within the range indicated to give control of the disease without injuring the tubers.

Acidulated Mercuric Chloride = 6 oz. mercuric chloride, 1 qt. commercial HCl/25 gal. water.

Soak sacked uncut tubers for 5 minutes, allow to drip and plant immediately, or dry out. This treatment is safe for potatoes planted on sandy and marl soils, but not safe on muck and peat soils. The solution is poisonous and corrosive and treated seed should not be eaten or fed to livestock.

**SQUASH**

Downy Mildew and Powdery Mildew

Same materials and formula as under cucumbers. Applications should begin before plants begin to bloom or before mildew appears. Squash is a quick maturing crop and spraying or dusting to control disease is not always a profitable investment. The large leaves are difficult to cover with a fungicide. In areas where mildews are favored by weather considerable benefit may be derived from spraying or dusting.

**Blossom Blight**

Same materials and formula as under cucumbers for downy mildew. Either treatment should help to check blossom blight, although spraying for it alone may not be profitable.

**STRAWBERRY—Nursery**

**Anthracnose**

Bordeaux - 6-6-100

Forms of copper that proved satisfactory - diluted to give metallic copper content of 1 1/2 lbs./100 gal. plus spreader-sticker.

7% metallic copper dust.

Apply during rainy, summer season at 7-day intervals, or oftener if there are daily showers.

**Leaf Spots**

Zineb (65%) - 4% dust in suitable diluent.

At 7-day intervals if weather conditions favor disease.

**STRAWBERRY—Field**

Use of fungicides is necessary during the summer in nurseries, but it is usually unnecessary to spray or dust field plants for control of diseases.
Leaf Spots
Same materials as shown above in nurseries.

Rhizoctonia Bud Rot
No fungicidal control. - shallow cultivation.

TOMATO-Seedbed

Late Blight
Nabam (27%) - 2 qts. plus 1 lb. zinc sulfate plus ½ lb. lime/100 gal.
Zineb (65%) - 2 lbs./100 gal.
Phygon - ½ to 3/4 lbs./100 gal.
Forms of copper that - diluted to give metallic copper content of ¹/₂ lbs./100 gal.

When late blight is favored by weather conditions begin spraying the plants as soon as they have emerged and repeat at 4 to 7-day intervals until transplanted. An application just before transplanting is desirable. Thorough coverage of all above-ground plant surface is imperative. Nabam, zineb and phygon sprays tend to stunt young plants when used frequently. To avoid this, alternate the nabam and zineb with phygon and Copper A.

In the Southern part of the state and on the West Coast copper fungicides will not control late blight. In these areas an alternating nabam and phygon schedule is recommended. In other parts of the state where late blight is less severe the copper spray may be alternated with nabam.

Do not use an insecticide with phygon, as the mixture may cause injury. Nabam, zineb and forms of copper that have proved satisfactory are compatible with recommended insecticides.

TOMATO-Field

Late Blight
Materials and formulas same as for seedbed above.

Begin applications immediately after plants have become established and repeat at 4 to 7-day intervals until end of harvest. Thorough coverage of all above-ground surface is imperative. Spray is more effective than dust.

Nabam is recommended as first choice in the Southern part of the state. In the other parts of the state where late blight is less severe copper sprays usually give satisfactory control. In areas and seasons which are not favorable for late blight, intervals between applications may be longer. In the Southern part of the state this is a risky venture because with blight present its spread may become very rapid with the return of favorable weather.

Early Blight
Materials and formulas same as for late blight above.

Where early blight and late blight occur together use the schedule recommended for late blight. In localities and seasons where early blight occurs, but late blight is not an important factor, coppers usually give satisfactory control of early blight.
Gray Leaf Spot

Materials and formulas same as for late blight above.

When late blight is not present applications at 7-day intervals are usually adequate. Gray leaf spot is not important in all tomato growing areas or in every year. When it does occur it causes extensive damage unless control measures are started on time. If late blight is also present the schedule recommended for late blight should be used.

WATERMELON

Anthracnose and Downy Mildew

Zineb (65%) — 4% dust in suitable diluent or 2 lb./100 gal.

Tribasic Copper Sulfate or other forms of copper diluted to metallic copper content of 1 1/2 lbs./100 gal., or 6% dust in suitable diluent.

Begin applications when runners begin to form or when first signs of disease appear; follow with 2 or 3 applications at 10 to 14-day intervals.

The importance of anthracnose and downy mildew varies widely from year to year with weather conditions. When the disease appears late, little benefit may be derived from spraying or dusting. When the disease appears early, early applications of a fungicide are effective in checking further spread. The time of appearance of a disease and weather conditions should serve as a guide as to how often and how many applications should be made. The same fungicide schedule is usually effective for all three diseases.

Gummy Stem Blight

Zineb (65%) — 4% dust in suitable diluent or 2 lb./100 gal.

Applied same as for anthracnose above.

Ext.
8/16/50
250