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Circular of Information No. 89

May 20, 1933

CALCIUM ARSENATE FOR CODLING MOTH CONTROL

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For the past five years the Entomology Department of the Oregon Experiment Station has been carrying on field studies of the relative effectiveness of certain insecticidal substitutes for the control of codling moth on apples and pears in Western Oregon. These investigations were initiated because of the arsenical and lead spray residue problem. A number of materials were tested including the following: Calcium arsenate, magnesium arsenate, potassium aluminum fluoride, nicotine sulfate 40%, Pyrocide 40 (a pyrethrum extract), sodium aluminum fluoride, barium fluosilicate and rotenone.

These experiments were carried on at the Oaco orchards near Monroe, Oregon. Ten trees were used in each test. Two varieties were used in each test plot, Ortleys and Newtowns. A large power sprayer equipped with a 4-cylinder pump and 10 horse power motor was used in these tests. The spray was applied by means of two single spray guns equipped with discs having 1/8 inch openings. Pressure was maintained at between 300 and 350 pounds. All the apples on each tree, including drop, were examined and the percentage of wormy apples, stings and clean fruit recorded.

Sprays were applied as follows:

Year	Calyx	First Cover	Second Cover	Third Cover	4th Cover
1928	May 8	June 6	June 28	Aug. 2	Aug. 20
1929	May 18	June 24	July 29	Aug. 26	
1930	April 30	June 19	July 9	Aug. 21	
1931	May 4	May 21	July 8	July 29	Aug. 14
1932	May 9	June 22	July 18	Aug. 11	

The cover sprays were timed by the use of bait traps, thermometer records, tree bands and cages.

Of all the substitutes used, calcium arsenate gave the best results. This material was used at the rate of 3 pounds to 100 gallons of water plus 2 pounds of hydrated lime in the cover sprays. The same dosage was used in the lead arsenate sprays. Only two pounds of the insecticide were used in the calyx spray.

Table of Results

Year	Calcium arsenate			Lead arsenate-check plot			Unsprayed Control		
	% Clean	% Wormy	% Stings	% Clean	% Wormy	% Stings	% Clean	% Wormy	% Stings
1928	97.3	4	2.3	91.5	2.1	6.4	30.0	67.0	3.0
1929	81.7	11.5	6.8	84.0	7.5	8.5	12.6	85.5	1.9
1930	86.1	7.5	6.4	89.0	6.5	4.5	15.2	82.0	2.8
1931	86.2	11.2	2.6	93.9	4.3	1.8	8.2	90.0	1.8
1932	84.0	10.8	5.2	84.7	11.6	3.7	13.9	85.3	.6

Average of clean apples for 5-year period:

Calcium arsenate	- - - - -	87.06%
Lead arsenate	- - - - -	88.6
Unsprayed plot	- - - - -	15.9

No injury was obtained either to fruit or foliage by the use of calcium arsenate in these tests. A considerable part of the Oaco orchards has been sprayed with calcium arsenate without the addition of lime for the past five years. No injury has resulted from these sprays.

#### Conclusions and Recommendations

Calcium arsenate has been reported not only to cause injury to the foliage and fruit but also to be less effective in codling moth control than lead arsenate. The results obtained from these tests apparently show that the aforementioned limitations of calcium arsenate do not prevail in the Willamette Valley. The information accumulated from the five-year tests show calcium arsenate to be only slightly less effective than lead arsenate, and to have caused no apparent injury to the foliage and fruit. It is believed, therefore, that calcium arsenate can be recommended as a substitute for lead arsenate in the codling moth spray program for the Willamette Valley. The addition of lime or other material as a buffer to prevent damage to the foliage and fruit does not appear to be necessary in the Willamette Valley.

Because of the reported injury and lower worm control in other districts, it is suggested that tests be conducted in the various districts to determine the advantages and limitations of calcium arsenate under varying geographical and weather conditions. If these tests are conducted, a buffer of hydrated lime of 1 pound to fifty gallons of spray is added. The addition of lime appears to be of value in preventing calcium arsenate from injuring the foliage and fruit of apples and pears. On the other hand, there is some evidence to indicate that the addition of a buffer lowers the effectiveness of the insecticide in worm control.

For information on the Oregon apple and pear spray program for codling moth, the reader is referred to the Oregon State Agricultural College Extension Bulletin 458. The timing of the codling moth cover spray applications is exceedingly important. Growers are advised to consult local county agent or Experiment Station for information on timing the sprays.