Tindivanam. Being a leguminous crop capable of fixing atmospheric nitrogen it can be expected to establish itself well in normal conditions in light sandy soils provided lime, phosphate and other esential ingredients are present in the soil in sufficient quantities. Another peculiarity with this crop, as in common with other legumes is, that when grown in association with cereals, the latter thrive better than when cultivated alone, due evidently to the nitrogen enrichment of the soil by the legume. The 'Mauritius' variety, when first introduced in this tract, came up well even in the poorest soils which received no manure.

The manurial problem with this crop did not present much difficulty in the earlier years. Later, however, continuous cultivation of this crop in the same land affected the yields and application of manures in the form of lime, farm yard manure, sulphur and bone meal was resorted to, and trials were conducted to assess the exact manurial needs of this crop. In an experiment at Palur it was noticed that application of super (1 cwt. per acre) *plus* ammonium sulphate (2 cwt.) increased the yield by about 20 per cent over 'no-manure' with an yield of 1,130 lb. pods per acre. Manurial experiments were started at the Agricultural Research Station, Tindivanam, with the aid of a grant from the Imperial Council of Agricultural Research to test the effect of artificials supplying nitrogen, phosphoric acid and potash, individually and in combination, with and without a basal dressing of cattle manure. Significant results have been obtained consecutively for two years in favour of the full combination of artificials N *plus* K *plus* P, the increase being 12 per cent over the control with an yield of 950 lb. of pods per acre. Basal dressing of cattle manure at 3 tons per acre did not show any effect on yield.

(To be continued)

https://doi.org/10.29321/MAJ.10.A04594

Preliminary Trials with Oil Emulsions for the control of Insect Pests

By M. C. CHERIAN and E. R. GOPALA MENON,

Agricultural Research Institute, Coimbatore

Introduction The non-availability of chemical insecticides due to the prevailing war conditions has induced Economic Entomologists in India to endeavour to find out suitable and efficient indigenous substitutes. During the investigations carried out at the Agricultural Research Institute, Coimbatore, Cherian and Ramachandran (1941) have reported that the kernels of *Thevitia neriifolia* Juss are found to possess insecticidal properties of a high order. In the course of these experiments there were indications that vegetable oil emulsions as a class possessed valuable insecticidal properties. A considerable amount of valuable work has been done in other countries in respect of mineral oil emulsions but there is very little on record regarding investigation on the insecticidal properties of vegetable oil emulsions against crop pests. It was thought that such a study would

be of material advantage in the field of economic entomology in India especially under the existing conditions when oils of mineral origin are difficult to procure. Accordingly studies were undertaken with castor oil, groundnut oil and neem (margosa) oil. This paper gives a short account of the preliminary trials conducted under laboratory conditions. The information gathered so far, gives encouraging indications as to the possibilities of utilising such oil emulsions for the control of insect pests of crops.

Materials and methods The raw, unpurified oils of castor, groundnut and neem available in the bazaars were taken as the basic material for the trials. Stock emulsions were first prepared by taking ½ oz by volume of each of the oils and shaking this in a bottle for a fixed time with ½ oz. of soft soap dissolved in 500 cc. of soft water. Immediately after the emulsification they were further diluted with soft water to make up one gallon of the spray fluid. The emulsions were then used for spraying. The effect of emulsifying the cold extract prepared from the kernels was also studied, for which a known quantity of the kernels was well mashed in a mortar and allowed to soak for 24 hours. The cold infusion was then filtered through fine-meshed gauze, a known weight of soft soap added and the concentrated cold extract thus obtained, diluted to give one gallon of the spray fluid. The trials were conducted on sucking and biting insects like the caterpillars of *Eupterote mollifera* W, grubs of *Epilachna 12. punctata* M., nymphs of *Urentius echinos* D., *Aphis malvae* K, *Aphis gossypii* G and *Aphis medicagenis* K. In the case of *Aphis* and *Urentius* infested leaves freshly removed from the plants were used. The caterpillars and the beetle grubs used for the trials were selected as far as possible of the same stage of development. All the insect specimens were exposed on muslin to the spray for 20 seconds at an average pressure of 6 kg per sq. cm. The sprayed insects were removed to glass cages and examined after 24 hours. Population and mortality counts were made by taking the counts of aphids in unit areas of 3 sq. cm. each, selected at random. The caterpillar and beetle grubs were examined at the end of 24 hours and again at the end of 48 hours, mortality counts being recorded both times and the latter count being taken as final.

The effect of spraying kernel infusions with and without the addition of soap Experiments were conducted to study the effects of the cold extracts prepared from the kernels of castor, groundnut and neem seeds with and without the addition of soap. Different dosages of the kernels and soap were tried. The results are given in Table 1.

The results in general indicate that kernel infusions of oil seeds are fairly efficient as insecticides and that their toxicity is increased by the addition of soap.

TABLE I. Effect of kernel infusions on insect pests, with and without soap

Pests concerned	Insecticide tried	Quantity of insecticide per gallon	Quantity of soap used per gallon	Mean percentage of mortality with soap	Mean percentage of mortality without soap
Eupterote mollifera (Moringa hairy caterpillar)	Castor seed	1 oz.	½ oz.	81	86
Epilachna 12-punctata (Brinjal lady bird)	,,	1 oz.	,,	86	86
Aphis gossypii G. (Cotton aphid)	,,	¼ oz.	¼ oz	91	71
Eupterote mollifera	Groundnut seed	1 oz.	½ oz.	83	41
Epilachna 12-punctata	,,	1 oz.	,,	78	42
Aphis gossypii G.	,,	¼ oz.	¼ oz.	91	43
Eupterote mollifera	Neem seed	1 oz.	½ oz.	86	72
Epilachna 12-punctata	,,	1 oz.	,,	94	69
Aphis gossypii G.	,,	¼ oz.	¼ oz.	75	82

The effect of oil emulsions on insects Spraying trials were conducted with the emulsions of castor, groundnut and neem oils. In the preparation of the oil emulsions soft water has been used. The emulsions with hard water bring in precipitation of calcium salts and thereby bring about the liberation of free oil and thus reduce the efficiency of the spray fluids. The three emulsions have given high mortality figures in respect of most of the insects tried. The results are indicated in Table II.

TABLE II. Effect of oil emulsions on insect pests

Pests concerned	Insecticide tried	Quantity of insecticide per gallon	Quantity of soap per gallon	Percentage of mortality
(1)	(2)	(3)	(4)	(5)
Aphis gossypii G. (Cotton aphid)	Castor oil	½ oz.	½ oz.	96
do.	Groundnut oil	,,	,,	100
do.	Neem oil	,,	,,	100
Urentius echinas D. (Brinjal lace wing)	Castor oil	,,	,,	33
do.	Groundnut oil	,,	,,	77
do.	Neem oil	,,	,,	91
Saissetia nigra N. (The black scale)	Castor oil	1 oz.	1 oz.	100
do.	Groundnut oil	,,	,,	77
do.	Neem oil	,,	,,	61
Eupterote mollifera W.	Castor oil	½ oz.	½ oz.	100
do.	Groundnut oil	,,	,,	94
do.	Neem oil	,,	,,	96
Achoea janata L. (The castor semilooper)	Castor oil	,,	,,	83
do.	Groundnut oil	,,	,,	89
do.	Neem oil	,,	,,	45

Plusia peponis F. (The snake gourd semi-looper)	Castor oil	"	"	80
do.	Groundnut oil	"	"	75
do.	Neem oil	"	"	97
Atteva fabricella (The Alanthus caterpillar)	Castor oil	"	"	93
do.	Groundnut oil	"	"	70
do.	Neem oil	"	"	93
Epilachna 12-punctata	Castor oil	"	"	95
do.	Groundnut oil	"	"	93
do.	Neem oil	"	"	91
Tetranychus telarius (The castor mite)	Castor oil	"	"	84
do.	Groundnut oil	"	"	94
do.	Neem oil	"	"	98

Comparative trials with oil emulsion and kernels infusions Trials were conducted to study the comparative efficiency of oil emulsions and the cold extract of the respective oil seeds. The latter possessed the advantage of easy preparation even with hard waters with a minimum of curdling, a phenomenon rather prominent in the case of oils. The results are given in Table III.

TABLE III Effect of oil emulsions and kernel infusions on insect pests.

Pests concerned.	Insecticide tried.	Mortality in seed			Mortality in oil		
		Quantity of seed used per gallon	Quantity of Soap used per gallon	Average % of mortality	Quantity oil used per gallon	Quantity of soap used per gallon	Average % of mortality
Euproctis mollifera W.	Castor	½ oz.	½ oz.	100	½ oz.	½ oz.	100
Epilachna 12-punctata M.	do.	"	"	100	"	"	100
Aphis malvae K. (The cucurbit aphid)	do.	"	"	94	"	"	100
E. mollifera W.	Groundnut	"	"	69	"	"	100
E *12-punctata* M.	do.	"	"	86	"	"	100
Aphis malvae K.	do	"	"	100	"	"	98
E. mollifera W.	Neem	"	"	66	"	"	94
E. 12-punctata M.	do.	"	"	86	"	"	100
Aphis malvae K.	do.	"	"	97	"	"	100

The oil emulsions were found to possess in most cases toxic values of a higher degree than the extracts prepared from the seeds. All the three oil emulsions would appear to possess toxic values in an equal degree.

Effect of treatment on foliage It has been found that a maximum dosage of ½ oz. of oil per gallon of water would be sufficiently toxic in the case of most insects. At this strength the emulsions were sprayed on the leaves of mango, citrus, sapota, guava, brinjal, cow-pea, lab-lab and cucurbitaceous plants. No deleterious action was noticeable in any case.

Reference

Cherian, M. C. and Ramachandran, S. (1942) *Thevetia neriifolia* Juss—A new indigenous vegetable insecticide *Madras Agri. J. 30, 260—64.*