EFFICACY OF PYRETHROIDS AGAINST POWDER POST BEETLES ATTACK ON FUELWOOD

Hanif Gul, Systematic Entomologist and *M. Ismail Chaudhry,* Director Forest Entomology, Pakistan Forest Institute, Peshawar.

ABSTRACT

Shisham fuelwood stacks of 1.40 m^3 (50 cft) each free of attack of powder post beetles were first sprayed with pyrethroids perigen (permethrin) 10% EC, cypermethrin 10% EC in doses of 0.1, 0.2, 0.4% and cislin (deltamethrin) 2.5% in doses of 0.01, 0.02 and 0.04% Dieldrin 20% EC in 0.5% dose was used as standared for comparison alongwith check (no treatment).

Half of the stacks were sprayed for the second time, three months after first spray with the same insecticides in same doses. Observations recorded in December, 1991 showed that permethrin gave 88% protection in two sprays in 0.4% dose. Cypermethrin 0.4% and cislin (deltamethrin) 0.04% afforded 100 and 95% protection, respectively, in two sprays. Dieldrin afforded 83% protection in 0.5% dose whereas no billet escaped infestation in control treatment.

INTRODUCTION

Powder fpost beetles or "ghoon" which damage sapwood portion of timber and firewood by converting it to powdery dust, is very common in Pakistan. "Ghoon" beetles attack sapwood of felled logs of many tree species but their damage to wood of certain leguminous trees is very serious. Two species of powder post beetles *Sinoxylon anale* L. and *Sinoxylon crassum* L. are common in the forests, timber depots, sawmills and factories. *Sinoxylon anale* is the most common and destructive species in the irrigated plantations.

Firewood produced in irrigated plantations is attacked by these beetles in large numbers which reduce the sapwood to dust within a short span of time. The attack is very serious and cause considerable losses.

Chaudhry (1960) besides reporting life and seasonal history and extent of damage caused by powder post beetles has described trials of a number of organochlorine compounds for the control of these beetles. Ghulamullah et al (1969) have recommended spraying of Dieldrin 2.27 litres in 90 litres (20 gallons) of water per 28 m^3 (1000 cft) of stacked wood followed by half the dose 2-3 months after for protection of 95 to 100% firewood billets. This treatment proved highly effective in the field and the losses due to powder post beetles were reduced by this method. It was standard field practice for 3 decades. But due to restricted manufacture and non-availability of these insecticides experiments were conducted with various available commercial insecticides Sevin, Lorsban, and Thiodan singly and in combinations for substituting the organochlorine compounds but without any tangible results.

Wood losses upto 50% have been reported due to Sinoxylon by Snyder (1927) in the wood stored for manufacture of various products. Dipping of logs in gamma BHC 1 - 2 parts with equal amount of Borex and 0.5% gamma hexachloride as a preventive measure against the attack of Bostrichid has been recommended by Jones (1959). Complete eradication could be achieved by heat sterlization in Kilns at 120°F and 60% humidity HIROSE (1981) reported the

effects of certain insecticides on *Lyctus brunneus*. Insecticides permethrin, fenvalerate, fenitrothion, lindane and chlordane were evaluated as a surface applied wood protectant to control *L. brunneus* Step. The minimum effective concentrations of treatment liquid for protection were 40 PPM for fenpropathrin, fenvalerate and lindane, 200 PPM for permethrin and fenitrothion and 1000 PPM for chlordane. Cypermethrin, permethrin, carbaryl, malathion, fenetrothion, methyl parathion and BHC have been reported as effective insecticides against *Dinoderus minutis* and *D. ocellaris* by Nair (1983).

MATERIAL AND METHOD

Synthetic pyrethroids - perigen (permethrin) 10% EC and cypermethrin 10% EC were tried in doses of 0.1, 0.2, 0.4% and cislin (deltamethrin) 2.5% EC in 0.01, 0.02 and 0.04% on 1.4 m^3 (50 cft) fuelwood stacks of shisham.

Half of the fuelwood stacks were sprayed again with the same insecticides in same doses, threee months after the first spray in May, 1991. The experiment was laid out on randomized complete block design with three replications of each treatment.

RESULTS AND DISCUSSION

Observations recorded on the efficacy of pyrethroids protecting the fuelwood from powder post beetles are tabulated below:

Efficacy of Pyrethroids Sprayed on Fuelwood against Powder Post Beetles upto 10 months.

Treatments and doses	% Billets Protected in				
	3 months	6 months		10 months	
	One spray	1st spray	2nd spray	1st spray	2nd spray
Perigen (Permethrin) 0.1%	96.5	4	52	8	18
Perigen 0.2%	100	17	95	2	77
Perigen 0.4%	99.5	58	100	23	88
Cypermethrin 0.1%	90	55	97	52	90
Cypermethrin 0.2%	100	53	100	89	100
Cypermethrin 0.4%	99.5	99	99	93	100
Cislin (Deltamethrin) 0.01%	99.5	58	90	8	55
Cislin 0.02%	100	38	100	11	94
Cislin 0.04%	100	52	100	12	95
Dieldrin 0.5%	86	80	83	68	83
Control (no-treatment)	27	7	0	2	0

Observations recorded in December, 1991 showed that perigen (permethrin) with two sprays in 0.4% dose gave 88% protection, while cypermethrin and cislin (deltamethrin) gave 100 and 95% protection in 0.4 and 0.04% dose with two sprays, respectively. The standard insecticides Dieldrin gave 83% protection against no protection in the control.

CONCLUSION

Cypermethrin sprayed on the firewood in 0.4% concentration twice at an interval of 3 months protected firewood completely from the attack of powder post beetles for a period of about one year. Deltamethrin (cislin) protected 95% wood in 0.04% concentration sprayed twice while permethrin (Perigen) in 0.4% dose and Dieldrin in 0.5% dose protected 88% and 83% wood billets, respectively, in two sprays.

REFERENCES

Chaudhry, G.U. 1960. The amalgamatged scheme for control of shisham defoliator, *Plecoptera reflexa* Guen. and trial of insecticides to control the powder post beetles, *Sinoxylon* spp. in the irrigated plantations of West Pakistan.

Ghulamullah, M. Ismail and M. Iqbal Ahmad, 1969. Control of powder post beetles in the irrigated plantations. Popular publication.

ITO,T.HIROSEC 1981. Effects of certain insecticides on Lyctidae Appl. Entomol. Zool. 15(3): 1980 EN. 293-298 (APEZA).

Jones, T. (1959). Major insect pests of timber and lumber in West Africa. West African timber Borer Res. Unit Tech. Bull. No.1:10-14.

Nair, K.S. Mathew, G.VARMA, R.V. (1983). Preliminary investigation on the biology and control of beetles damaging stored seed. KAFRI RESEARCH REPORT KERALA FOREST RESEARCH INSTITUTE NO.19(5): 35 pp.

Synder, T.E. (1927). Defects in timber caused by insect USDA. Dept. Bull. 1490: 46 pp.

PHYSICO-CHEMICAL COMPOSITION OF FIXED OIL FROM *RICINUS COMMUNIS* L.

Pazir Gul, Forest Chemist, and ***Muhammad Farooq,*** Assistant Forest Chemist, Pakistan Forest Institute, Peshawar.

ABSTRACT

The oil extracted with hexane from the seeds of locally grown *Ricinus communis* L. was analysed for its physico-chemical constants and the fatty acid composition. It was found to be non-drying oil comparing favourably well with oil from plants grown in colder climate but less unsaturated than Russian oil. It was also observed that the oil was of fair standard and could be used in place of oil from other *Ricinus* spp.

INTRODUCTION

Caster oil is extracted from the seeds of the plant, *Ricinus communis* L. found wild and cultivated in most tropical and sub-tropical regions. It is mainly cultivated in USSR, Brazil, India, Thailand, Romania and Bulgaria. In Pakistan it is found both wild and cultivated in N.W.F.P., Balochistan, Sindh and Punjab (7,9).

Caster oil is nearly colourless or pale yellow, having high density and viscosity which determine its property as a high quality

lubricant(6). This oil is largely employed in the manufacture of paints, varnishes, imitation leather, sticky fly-paper, typewriter ink, transparent and textile soap and in the production of brake fluid (6,7). It is also used as a simple purgative in all delicate conditions for children and adults (3,4). The seed cake, which is very poisonous, is used as fertilizer (6,7,10).

It has been reported that the seeds of the plant, *Ricinus communis* L. and *Ricinus chervonnaya* grown in USSR contained 50-55% and 68.2-74.3% fixed oil respectively (7). It was also reported that the seed of *Ricinus communis* L. contained 70-80% of kernel and 30-55% of fixed oil (6).

A sample of oil from *Ricinus communis* L. was examined and it was reported that it had the physico-chemical characteristics within the following limits; specific gravity at 15°C, 0.958-0.968; iodine number, 82-90; saponification value, 177-187; unsaponifiable matter, 0.3-0.7%l; refractive index, at 25°C; 1.4790-1.4813; and acetyl value, 143-150(6,7).

Ricinus communis L. grows generally on deep red sandy and clayey loams, alluvial loams, and even on rough gravelly lands(22,7). It thrives best in sandy soil. It has also been shown that on optimum water supply to plants, the weight of 100 seeds increased by 26-27 grams and oil content increased on an average by 5.7% when c ompared with unirrigated castor plants.

The present study was carried out to find the yield, physico-chemical characteristics and the fatty acid composition of oil from the seeds of indigenous species of *Ricinus communi* L. and to compare it with oil from exotic species in order to explore the possibility of its industrial utilizlation.

MATERIALS AND METHODS

The fruits of the castor plant, *Ricinus communis* L. were collected from Thai area of Hazara Forest Division. They were dried in shade and the shells were separated from the kernels. The kernels were crushed using mortar and pestle and the oil was extracted from the crushed kernels with the help of a Soxhlet apparatus using hexane as solvent. It was purified by treating with activated charcoal in the proportion of 4:1 by weight (6).

The mixture of oil and charcoal was exposed to sun rays for a long time usually 15 days. Impurities were absorbed by the charcoal and on filtering refined oil was sobtained (8). The physico-chemical charactelristics of the oil were determined following the standard methods reported in literature (1,5,6). Fatty acids composition of the oil was estimated using fractional precipitation and crystillsation techniques (7,9).

RESULTS AND DISCUSSION

The yield of oil from the seeds of *Ricinus communis* L. was found to be 52%. It compared favourably well with the oil yield (50-65%) redported (7) and with that exotic species of *Ricinus communis* L.(35-55% of an (6). The oil yield was low as compared to that of *Ricinus chervonnaya* (68.2-74.5%). It appears from the comparative study that the oil possesses a sound commercial viability. The resuslts of various physico-chemical constants are compared with results reported by other investigators in Table 1.

The quantitative value of the fatty acid content are also identical with the unsaponifiable matter and recinoleic acid percentage and lie within the general range of 0.3-0.7% and 80-92.3% aresspectively for the oils from colder habitate Table 2.

Table 1. Physico-chemical characteristics of *Ricinus communis* L. oil as compared with exotic species.

Sl. No.	Name of the constant	Lab. work	*R.communis* L. (reported.7)	*R.zanziberinus* (reported.6
1.	Specific gravity at 25°C	0.9637	0.953 - 0.964	--
2.	Refractive index at 25°C	1.4780	1.4695- 1.4730	1.4788
3.	Saponification value	179	177 - 187	179.2
4.	Acid value	3.5	4.0	--
5.	Iodine value	85	82-90	88.4

Table 2. Chemical composition of oil of *Ricinus communis* L. as compared with oil from exotic species.

Sl. No.	Name of constituent	*R.communis* L. (Lab.sork) %	*R.communis* L. (reported.7) %	*R.zanziberinus* (reported.6) %
1.	Saturated fatty acids	5	-	0.5
2.	Unsaturated fatty acids	95	-	99.5
3.	Unsaponifiable matter	0.7	0.3 - 0.7	-
4.	Recinoleic acid	89.0	80.0	92.3
5.	Oleic acid	6.4	9.0	-
6.	Linoleic acid	-	3.0	6.6
7.	Stearic and dihydroxy shearic acid	-	3.0	-

CONCLUSION

With a comparatilvely low oil yield i.e 52% as compared with 68.2-74.5%s of the *Ricinus chervonnaya*, a Russian sample, the oil from the indigenous source (*R. communis* L.) seems to show a bright qualitative picture, useful for its commercial exploitation in various iondustrial uses such as leather, textile, soap, brake fluid and as purgative in medicine

REFERENCES

ASSOCIATION OF OFFICIAL ANALYTICAL CHEMIST(1980). Official Methods of analysis 13th Ed. Washington D.G. P-437.

AIYAR,A.K. (1958). Field Crop of India, Banlore, PP.148-1.

BRITISH PHARMACOPOEIA (1953) "*Ricinus communis* L. "The Pharmaceutical Press 17-Bloomsburry square London WCI. P.128.

BRITISH PHARMACOPOEIA (1973) "*Ricinus communis* L." Her Majesty's Stationary Office London. P.86

JACOBS,M.B. (1962). The Chemical Analysis of Food and Food Products D. Van. Nostrand Co., London. P.44

JAMIESON,G.S. (1943). Castor oil. "Vegetable Fats and oil" 2nd Ed. Reinhold Publishing Corporation. New York, Pp.47-55.

MOSHKIN,VA (1986). "Castor". Amerind Publishing Co.Pvt. Ltd.,New Dehli. Pp.65-80.

NADKARNIS,A.K.(1954). "*Ricinus communis* L." Indian Materia Medica Vol.I. Popular Book Depott. Bombay Pp.1065-1067.

ROSENTHALAR,L.(1930). "Separation of the saturated from Unsaturated Fatty Acids". The Chemical Investigation of Plants. G.Bell and Sons, Ltd.London. P.82-86.

ZAMAN,M.B. and M.S. KHAN (1970). "*Ricinus communis* L". Hundred Drug Plants of West Pakistan, Medicinal Plant Branch Pakistan Forest Institute,Peshawar. P. 59.