1.0 PYRETHRUM REPELLENT FACTORS AGAINST STORED GRAIN WEEVILS

1. Paul K. Ndalut*
Chemistry Department
Moi University
P.O. Box 3900 ELDORET,
Kenya

and

2. Pamela Saggar
Environmental Science Faculty
Kenyatta University
P.O. Box 43844 NAIROBI,
Kenya

2.0 INTRODUCTION.

Pyrethrum is a well known Natural Product (Botanical) Insecticide whose active principles are commercially available for the control of insect pests. The desirable attributes of Pyrethrum are:

- It is a kill agent and this property enjoy tremendous enhancement by the incorporation of synergists in various formulations.
- It is a strong knock down agent to many pests. The dose required to knock down a housefly is 3.32×10^{-12}g and that for mosquito is 1.4×10^{-9}g.
- It is a flushing agent, causing sensory agitation which makes insects move out of their hiding and thus expose themselves to more insecticides from which they eventually die.
- It is also an acknoledged Repellent against a number of insect pests, causing them to avoid or leave a place which is treated with pyrethrum.

Unlike many pesticides Pyrethrum is biodegrable in the environment and on animal tissues, thereby making it non-persistent and relatively safe to warm-blooded animals. It is also free from potentialities to cause the development of resistance to many insects. All these facts taken together make pyrethrum a potential alternative to Methyl Bromide in stored grain fumigation and other relevant areas (1).

Repellency Factor in Pyrethrum flowers has received little attention. It has been amply demonstrated in the case of stored product insects, on food packages and so forth. For instance, stored grains can be kept free of insect pests for up to 11 months(2). The nature and identity of this component has not been determined.

As part of our Research Programme at Moi University, designed to seek Alternatives to Methyl Bromide in Grain and Soil Fumigation, we decided to look at the Factors responsible for Repellency in Pyrethrum Flowers/ concentrate.

3.0 PRELIMINARY RESULTS

3.1 THE BIOLOGICAL ACTIVITIES OF PYRETHRUM ESSENTIAL OIL

The repellency bioactivity of the essential oil was carried out using the Y-tube olfactometer mehtod (3). In table 1, are shown the percentage repellencies of the essential oil of pyrethrum at varying concentrations. These are compared with the commercial insect repellent, N,N-Diethyl-m-toluamide (DEET).

Table 1. Mean Repellencies of Pyrethrum Essential Oil. Pyrethrum & Deet To Sitophilus Zeamais

Treatment (L)

Sample	1	0.1	0.01	0.001	0.0001
Pyrethrum Essential oil	73.50	57.77	52.75	50.16	45.41
DEET	54.54	47.20	39,98	31.30	20.66
Standard Pyrethrum	47.19	38.34	21.98	13.13	-
Pyrethrum + Essential oil	62.26	32.82	20.00	-	-

These preliminary results indicate that the essential oil of Pyrethrum exhibit a higher degree of repellency to sitophilus Zeamais than Pyrethrins and the commercial repellent, DEEF.

3.2 CHEMICAL CHARACTERISATION OF ESSENTIAL OIL OF PYRETHRUM

The chemical identification of the essential oil was achieved by GC-MS and the computerised mass spectral matching of the adduced spectra with those published for pure components have been tentatively identified.

Table 2: Composition of the Essential oil from Pyrethrum Flowers

Peak	Compound	Relative (%)
1	Decane-2,6,7, Trimethyl	23.67
2	Trans-DL-Chrysanthemic acid	3.33
3	-Farnesene (E orZ)	30.36
4	-Phenylethyl isoralate	2.47
5	Germacrene/ - Cubebene	12.67
6	Cadinene	2.98
7	-Nerodiol	10.44
8	Spathulenol	5.44
9	-DL-allethrin	1.33
10	Farnesene	3.22
11	Cadinol/t-cadinol/ + Muurolol	0.52
12	Verucarol	2.23
13	Farnesene (E/2)	1.07

4.0 BIOASSAY OF ISOLATED COMPONENTS

Work is now in progress to isolate pure components for Repellency assessment to determine the most active component(s).

5.0 REFERENCES

(1) Casida J.E (1973). Pyrethrum: The Natural Insecticide Academic Press, NY.

(2) Glynne Jones, G.D. and N.K. Slyvester, (1966). Pyrethrum As An Insect Repellent, Part I, Literature Review. Pyrethrum Post 8(4) 38-41.