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Estimate Relative Toxicity of Ether Extracts of Various Plant Products for Management of Pulse Beetle, Callosobruchus Maculatus (Fab.)

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ABSTRACT

Experiments were conducted to determine infesting the stored cowpea seeds. In Agriculture cultivation of pulses is an aspect because pulses are the most essential important source of protein. The present study is aimed at the search of Eco-friendly pesticides. Ether extracts plant products that affect the development of the pulse beetle, Callosobruchus maculatus (Fab.) infesting the stored cowpea seeds. In agriculture, cultivation of pulses is an aspect because pulses are the most essential important source of protein. The present study is aimed at the search of some Eco-friendly pesticides. The worldwide 2000 plant species have been employed for pest control. Present study was designed to assess the efficacy of five plant extracts Viz; Neem seed kernel, Mustard, Black pepper, Annona and Groundnut seeds were toxic to control adult insect pests, Relative toxicity calculated by taking neem seed kernel ether extract as a standard check plant product. Ether extracts were found effective to control adult insect pest Callosobruchus maculatus. Probit analysis was performed by estimating LC_{50}.

***Keywords**: Relative toxicity, Ether, Neem seed kernel, Mustard, Black pepper, Annona, Groundnut, Seeds, Callosobruchus maculatus.*

Introduction

Humanity and human beings' existence is cannot perpetuate unchecked without maintaining harmony with nature. The major issue of stored grain pest infestation has become a global concern due to its impact on quality and quantity of stored grain cowpea seeds. Various plant products extracts were evaluated for protection of cowpea seeds from infestation of pulse beetle, *Callosobruchus maculatus.* The plant products as ether extracts are more effective and less harmful to crops in comparison to the chemical pesticides. The present work deals with a study of Relative toxicity of different plant products of Neem seed kernel, Mustard, Black pepper, Annona and Groundnut seed extracts were found effective to control *Callosobruchus maculatus*. This study, which evaluates the efficacy of five plant product extracts for managing the bruchid beetle, *Callosobruchus maculatus,* is significant in the sustainable agriculture and pest management. The present paper also describes an aim to search Eco-friendly pesticides.

Male *Callosobruchus maculatus* Female *Callosobruchus maculatus*

Material and Methods

All plant seed extracts were prepared in ether. Extraction was done by Soxhlet apparatus for 08 hours over a heating mantle at 70 Degree Celsius temperature in petroleum ether. Extraction of all different plant product treatments of N.S.K.E., M.S.E., B.P.S.E., A.S.E. and G.S.E. were used to treat cowpea seeds for Relative toxicity. All experiments were conducted in triplicate. Thus by Finney's (1952,1981) method of probit analysis, the LC_{50} Values were calculated. Regression lines were drawn between log concentrations of used plant product extracts and their empirical probits to get expected probit Y'

Plant Products

Soxhlet apparatus

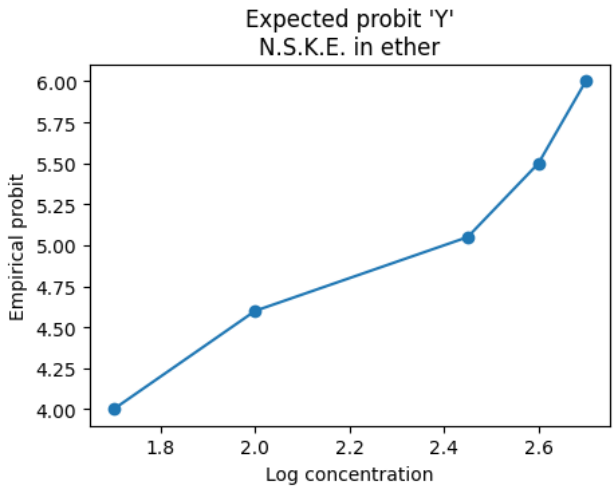
Table: Relative toxicity of different plant product Extracts in Ether to the adults of *Callosobruchus maculatus* (F.)

S. No	Plant Product	Heterogeneity $X^2(3)$	Regression Equation	LC50 (ppm)	Relative Toxicity	Fiducial Limit		
						Lower	Upper	Sm
1	N.S.K.E.	4.3569	Y=1.96663x+0.59433	173.86030	1.0000	142.1007	205.6198	0.0932
2	M.S.E.	10.6420	Y=2.05134x−0.35825	409.32719	2.3543	338.2445	480.4098	0.0886
3	B.P.S.E.	5.3623	Y=3.15089x−4.02736	732.84141	4.2151	642.7910	822.9805	0.0627
4	A.S.E.	6.3701	Y=4.00644x−7.11580	1057.00284	6.0796	959.2288	1154.7769	0.0471
5	G.S.E.	7.0286	Y=4.27390x−8.21240	1234.20594	7.0988	1130.4900	1337.9210	0.0428

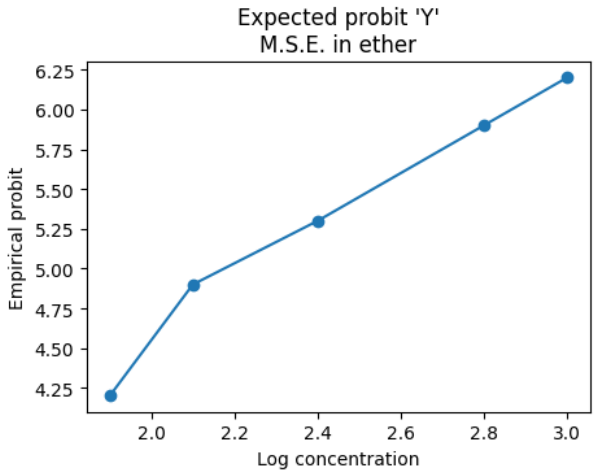
N.S.K.E.: Neem seed kernel extract
M.S.E: Mustard Seed Extract
B.P.S.E.: Black pepper seed extract
A.S.E.: Annona seed extract
G.S.E: Groundnut seed extract

Y=Prohibit Kill
X = Log concentration
Sm = Standard Error

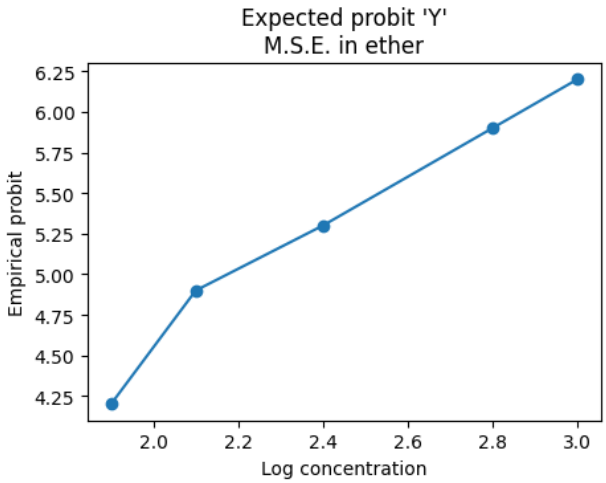
In none of the cases the data were found to be significantly heterogeneous at P = 0.05



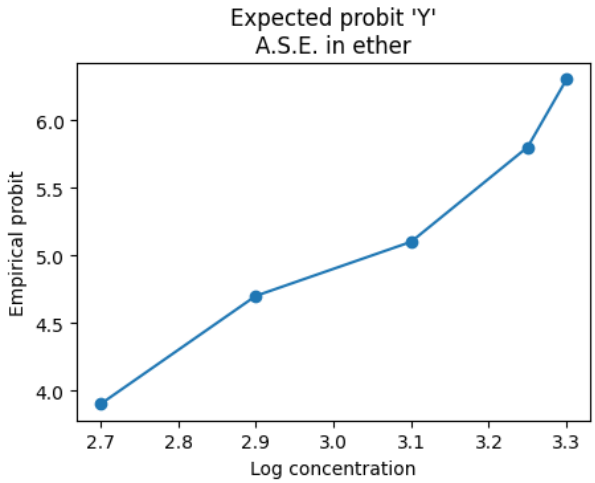
Graph 1: N.S.K.E. in ether



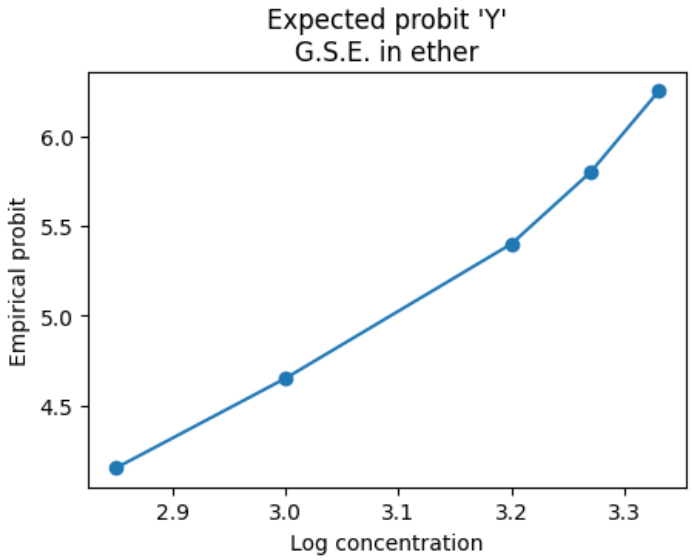
Graph 2: M.S.E. in ether



Graph 3: B.P.S.E. in ether



Graph 4: A.S.E. in ether



Graph 5: G.S.E. in ether

Result And Discussion

- Neem seed kernel extract in ether resulted in 173.86030 LC_{50} value in ppm. Its value was estimated as 1.000 as a standard to calculate relative toxicities of other plant extracts.
- Mustard seed extract in ether resulted in 409. 32719 LC_{50} µ/gm (p.p.m.) and its Relative toxicity was 2.3543.
- Black pepper seed extract in ether showed LC_{50} value of 732.84141 µ/gm (p.p.m.) and its Relative toxicity was 4.2151.
- Annona seed extract in ether resulted in LC_{50} value of 1057. 00284 µ/gm (p.p.m.) and its Relative toxicity was found to be 6.0796.
- Groundnut seed extract in ether showed LC_{50} as 1234.20594 µ/gm (p.p.m.) and its Relative toxicity was 7.0988.
- Hence the Relative toxicity of different plant extracts in ether was calculated. Abbott's formula (1925) was applied for calculation of corrected percent mortality.

Conclusion

In the present study, among the plant products the Relative toxicity experiments show that there is no adverse effect of all the plant extracts in ether. It has been estimated through various research works based on chemical pesticides, that these chemicals are highly toxic to environment, crops and Human as well as Livestock health. In the present study, among the plant products Neem seed shows promising results both in biological parameters as well as repellency against *Callosobruchus maculatus*. However, in the present investigation, the minimum tolerable dosages were applied.

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