A study on mortality of *Callosobruchus chinensis* L. (Coleoptera: Bruchidae) when treated with various formulations of plant *Phyllanthus amarus* (Euphorbiaceae)

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***Abstract*—**The pulse beetle Callosobruchus sp. (Coleoptera: Bruchidae), is a major pest of economically important leguminous grains, such as cowpeas), lentils, green gram, and black gram (Talukder & Howse, 1994; Park et al., 2003).As it is not advisable to mix insecticides with food grains the plant materials appear to be the most promising agents for grain protection against them. Euphorbiaceae is world wide in distribution and exposed to all sorts of habitats. A chemical review of the different classes of compounds which have been isolated from the Euphorbiaceae (other than the diterpenoids) has been given by Abdel-Fattah (1987). Members of this family have been reported to possess anti- bacterial (El-Bassuony,2007; Ogbulie et al., 2007; Valente et al., 2004; Zakaria et al.,2006; Falodun et al., 2008; Awanchiri et al.,2009), anti-viral (Bedoya et al.,2009;,Bentacur-Galvis et al.,2002;Lin et al., 2002), anti-fungal (Cox et al.,2006; Devi and Gupta, 2000), nematicidal (Shakil et al.,2006;Shi et al.,2007;Shi et al.,2008; Dahiya, 2008), molluscidal (Dos Santos et al., 2007; de Vasconcellos and de Amorim,2003) and insecticidal (Liu et al., 2007;Adebowale and Adedire, 2006; Shripad, 2003;Maria et al.,2004).The present work was therefore carried out to screen a member belonging to family Euphorbiaceae viz., *Phyllanthus amarus* against the pulse beetle C. chinensis Linn..

***Keywords*—** Callosobruchus chinensis L. (Coleoptera: Bruchidae), plant *Phyllanthus amarus* (Euphorbiaceae.

I. Materials and Methods

THE pulse beetle C *chinensis* was raised on green gram *Vigna radiata* in incubators maintained at 28 + 20C and 70% RH. The leaves of plant *Phyllanthus amarus* belonging to family Euphorbiaceae were collected, cleaned and shade dried. Specific number of adult insects were released in muslin cloth covered beakers containing weighed green gram grains and treated with crude extract, aqueous suspension, soxhleted aqueous, ethanol and diethyl ether extracts at 1.0, 5, 10 and 25 % dose concentrations. For comparison normal and controls sets were also kept. Each experimental set comprised of five replications. The total number of adult insects surviving after three days of treatment was counted and per cent mortality was calculated. The data obtained was statistically analyzed employing ANOVA using SPSS (2004) analysis.

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II. Results and Discussion

The per cent adult mortality of C. chinensis under different treatments of the plant studied has been presented in Fig. 1. The observations revealed that many of the treatments resulted in significantly ($p<0.01$) high mortality of the insect pest as compared to normal (5 to 10 % mortality) and control (5 to 15 % mortality). The crude extract at 25% concentration resulted in 100 % mortality, while the other two treatments at the same dose concentration resulted in 85 to 95% mortality of the pest insect. 1% extracts were also noted to be highly effective and 60 to 70% of the insects were found to die when treated with the formulations.

R. communis belonging to family Euphorbiaceae was screened for its insecticidal property by Roark (1947). Dried ground leaves of R.communis against C. maculatus were used by Okonkwo & Okoye (1992) and the grains were found to be protected from damage for more than three months. El-Hag et al. (1996) evaluated some wild herb extracts including those of *Chrozophora verbascifolia* belonging to family Euphorbiaceae for the control of mosquitoes. Jayasuriya (2000) studied the structure and stereochemistry of rediocide A, a highly modified daphnane from *Trigonostemon reidioides* belonging to family Euphorbiaceae exhibiting potent insecticidal activity. The insecticidal of P. amarus against *Tribolium castaneum* was reported by Khanna et al. (2003). Valencia et al. (2006) studied the effect of J. gossypifolia leaf extract on three lepidoptera species. Mbailao et al. (2006) reported the oil of R. communis to affect the longevity of adults, the number of eggs laid and adult emergence of C. maculatus. All these reports support the present findings. Insecticidal activity of E. antiquroumlates was studied by de-Silva et al. (2008) and significant mortality of pest insects was noted by them. Phowichit et al. (2008) evaluated the insecticidal activity of J. gossypifolia belonging to Euphorbiaceae against Spodoptera litura. Toxicity of Jatropha seed oil to Callosobruchus maculatus has been studied by Boateng & Kusi (2008). Govindrajan et al. (2008) tested leaf extracts of Acalypha indica belonging to

Euphorbiaceae against A. stephensii. Aiyelaagbe & Gloer (2008) isolated many compounds including flavanoids, steroids, alkaoids and diterpenoids from *Jatropha podagrica*. According to them Jopadic acid which was one of the components showed insect growth inhibition activity. The bio-pesticidal activity of *Jatropha curcas* seed in controlling the pest *Helicoverpa armigera* and *Bemisa tabaci* was studied by Arvinda et al. (2009) who concluded that this plant can be used as an alternate safe and eco-friendly insecticide. Uma et al. (2009) also tested the efficacy of some Euphorbiaceae plant extracts against cabbage diamondback moth *Plutella xylostella* and reported some degree of activity among all the plants tested and nine to have insecticidal property against the tested pest. Gayer et al. (2009) suggested toxicity of E. peplus towards mosquito larvae. Nazar et al. (2009) screened *Phyllanthus amarus*, *Acalypha indica*, P. emblica, *E. thymyfolia*, *jatropha gossypifolia*, *Ricinus communis* and *Croton bonplamdianum* all belonging to Euphorbiaceae against *Culex quinquefasciatus*.

The result of the present study therefore suggests that the plant *Phyllanthus amarus* has got a potential to be used as an alternate as against chemical insecticide especially against *Callosobruchus chinensis*.

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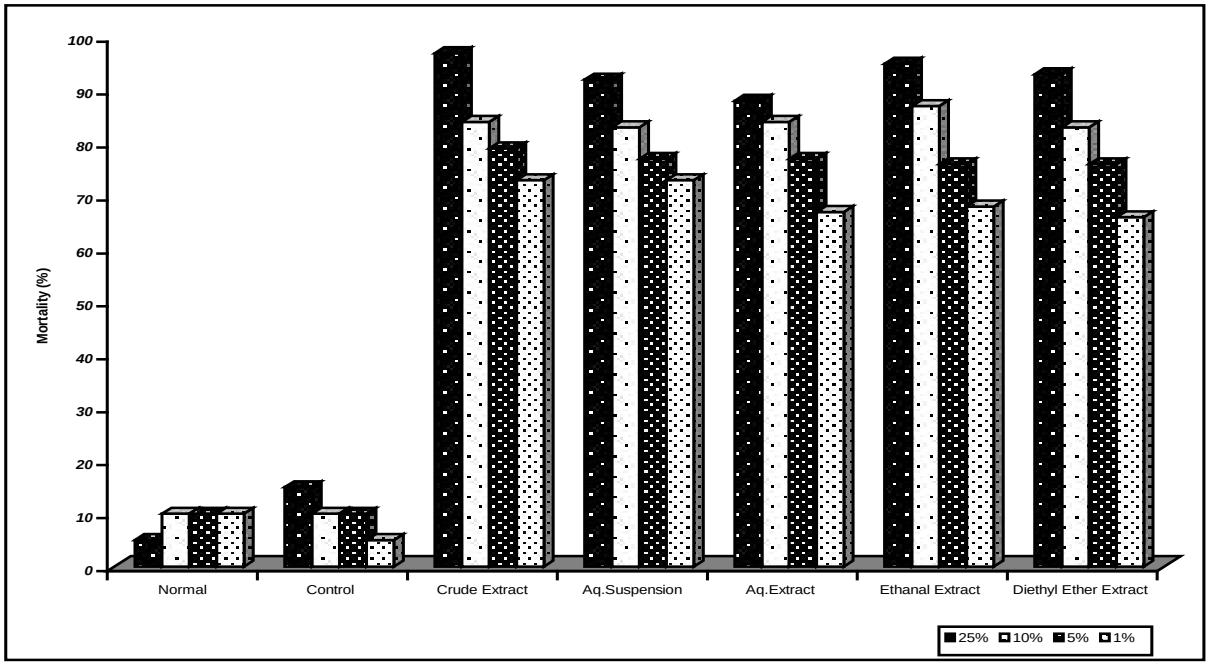

Fig. 1. Percent adult mortaility of Callosobruchus chinensis under treatment of different formulations of leaves of Phyllanthus amarus