Research Paper :

Efficacy of biorationals in management of potato shoot borer, *Leucinodes orbonalis* Guenee

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SUMMARY

A field experiment was conducted on potato shoot borer, *L. orbonalis* during *Kharif* 2002 at the Main Agricultural Research Station, University of Agricultural Sciences, Dharwad under rainfed conditions. The effectiveness of biorationals imposed three times at 30, 50 and 70 days after planting against potato shoot borer indicated that Nimbecidine @ 5 ml/l and NSKE @ 5 per cent were proved significantly superior in reducing the shoot infestation after each spray followed by spraying of pongamia oil @ 2 per cent and single application of neem cake @ 240 kg/ha. The significantly higher tuber yields were recorded in Nimbecidine @ 5 ml/l (35.82 q/ha) and NSKE @ 5 per cent (33.38 q/ha) with higher B: C ratios of 4.48 and 6.78, respectively which were followed by pongamia oil @ 2 per cent (30.91 q/ha) and neem cake applied once 240 kg/ha (28.07 q/ha).

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Potato (*Solanum tuberosum* L.) is used as staple food in other countries but in India, it is used as vegetable rather than staple food. There are many production constraints in potato cultivation, of which occurrence of many pests right from sowing to harvesting is one of the most important reasons. Thirty three species of insects and a species of mite belonging to 9 orders and 23 families were reported on potato from Hassan at different stages of the crop growth (Nandihalli *et al.,* 1996). Among the insect pests, the shoot borer, *Leucinodes orbonalis* Guenee has become a serious pest on potato in recent years and the damage caused by the pest was reported to the extent of 41.87 per cent shoot damage (Niranjanamurthy and Nandihalli, 2003). Farmers depend mainly on chemicals for controlling this pest. The biorationals are cheap, non-phytotoxic, easily biodegradable and do not leave any harmful toxic residues besides conserving natural enemies and have varied insect controlling properties *viz.,* antifeedant, repellent, attractant, reproductive retardant and hormonal regulation etc. (Urs, 1987). As such, chances of pests developing resistance to the botanicals are less likely. Realizing the hazards involved in the use of conventional insecticides and appreciating the need to protect the food crops, the present study was under taken to evaluate the efficacy of the biorationals against *L. orbonalis*.

MATERIALS AND METHODS

A field experiment was conducted on potato shoot borer, *L. orbonalis* during *Kharif* 2002 at the Main Agricultural Research Station, University of Agricultural Sciences, Dharwad under rainfed conditions and was laid out in Randomized Block Design with 9 treatments replicated thrice. The plot size was 3 x 3.6 m. Kufri Chandramukhi, a variety of potato was sown adopting spacing of 60 x 20 cm between rows and plants, respectively. The recommended agronomic practices were followed to raise the crop. Seven biorationals were evaluated against *L. orbonalis* along with carbaryl 50 WP, standard chemical check and untreated control (Table 1). All the treatments were imposed at 30, 50 and 70 days after

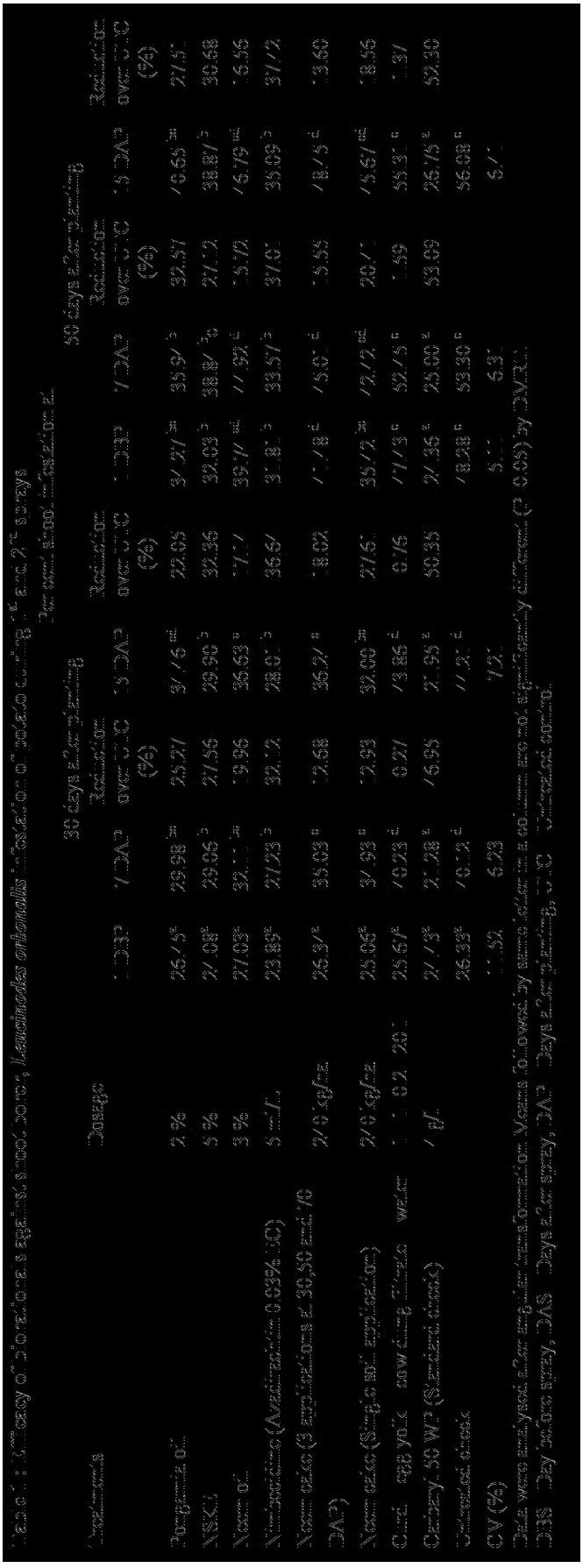
planting. The required quantities of spray solutions of botanicals and animal products were prepared at the time of application. Nirma soap powder @ 0.25 g/l was added to dissolve the NSKE, neem oil and pongamia oil.

Observations were recorded on number of shoots showing withering symptoms and total number of shoots per plant on ten randomly selected plants from each plot a day before, 7th and 15th day after imposing treatments. The data on the shoot damage by the pest were converted into percentage values. At the time of harvest, tuber yield was recorded from each plot and further the plot yield was computed on hectare basis. Data were subjected to statistical analysis.

RESULTS AND DISCUSSION

The data presented in Table 1 reveal that there was no significant difference with respect to shoot infestation among the treatments a day before first spray. However, at 7 days after imposing the treatments, Nimbecidine 0.03 per cent @ 5 ml/l and NSKE @ 5 per cent were found superior compared to rest of the treatments by recording lower shoot infestation of 27.23 and 29.06 per cent, respectively with higher per cent reduction of shoot damage over untreated control of 32.12 and 27.56 per cent, respectively which were found at par with spraying of pongamia oil @ 2 per cent (29.98%) and neem oil @ 3 per cent (32.11%). The next best treatment was neem cake three and one application and was at par with pongamia oil and neem oil. The spraying of curd + egg yolk + cow dung filtrate mixture was found least effective (40.23%) and was at par with untreated control (40.12%). The standard chemical check carbaryl 50 WP @ 4 g/l was significantly superior over biorationals (21.28%). At 15 days after spray, Nimbecidine and NSKE were found superior in reducing the shoot infestation of 28.01 and 29.90 per cent with 36.64 and 32.36 per cent reduction over untreated control, respectively. However, highest reduction of 50.35 per cent shoot infestation was recorded in carbaryl treated plots.

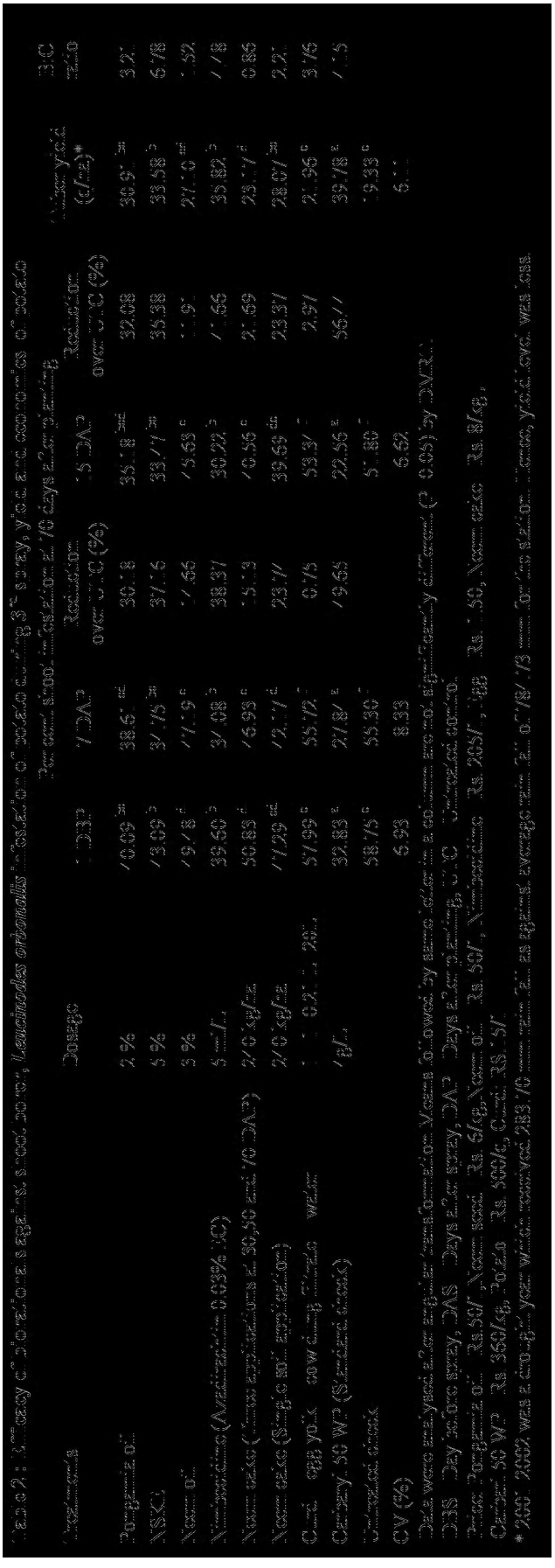
A day before second imposition of treatments, less shoot infestation was recorded in Nimbecidine (31.81 %) and NSKE (32.03%), which were found statistically at par with pongamia oil (34.27%) and neem cake single application (35.42%). The next best treatments were neem oil (39.74%) and neem cake applied thrice (41.48%). However, carbaryl 50 WP @ 4 g/l was significantly superior in recording shoot damage (24.36%). At 7 days after second treatment, Nimbecidine and pongamia oil recorded the less shoot infestation of 33.57 and 35. 94 per cent, respectively with higher



decrease in shoot infestation over untreated control (37.01 and 32.57%, respectively). These two treatments were at par with NSKE (38.84%) which accounted for 27.12 per cent reduction over untreated control. The next best treatments were neem cake applied once (42.42%) and neem oil (44.92%). However, carbaryl was significantly superior in recording lowest shoot infestation (25.00%) with highest per cent reduction in shoot infestation over untreated check (53.09%). At 15 days after second spray, the lower shoot infestation was recorded in Nimbecidine (35.09%) and NSKE (38.87%) with 37.42 and 30.68 per cent reduction in shoot damage over untreated control, respectively which were on par with pongamia oil (40.65%). The pongamia oil treatment was found at par with neem cake applied once (45.67%) and neem oil (46.79%). However, the lowest shoot infestation with highest reduction of infestation over untreated control was recorded in standard chemical check carbaryl. Among biorational, curd + egg yolk + cow dung filtrate treatment was least effective (Table 1).

Significantly less shoot infestation was recorded in Nimbecidine (39.60%) and NSKE (43.09%), a day before third sprays (Table 2) which were at par with pongamia oil (40.09%). The next best treatments were single application of neem cake (47.29%), neem oil (49.48%) and neem cake three applications (50.83%). However, none of the biorationals proved superior over the carbaryl treatment, which recorded lowest shoot damages (32.83%). At 7 days after 3rd spray, Nimbecidine was significantly superior in recording lowest shoot infestation (34.08%) and highest reduction of shoot infestation over untreated control (38.37%) with 38.37 per cent decreased shoot over untreated control which was found at par with NSKE accounting 34.75 per cent shoot damage with 37.16 per cent reduction of shoot infestation over untreated control. The next best treatments were pongamia oil (38.61%) and neem cake applied once (42.17%) in recording less shoot infestation with higher reduction of shoot infestation over untreated control. Similar trend was observed at 15 days after third spray with respect to shoot infestation and per cent decrease over control (Table 2).

During the investigation, biorationals *viz.*, Nimbecidine and NSKE which recorded higher reduction of shoot infestation at 15 days after third spray. The efficacy of these two botanicals may be due to azadirachtin content, which exhibited high antifeedant and insecticidal property resulting in early instar larval mortality. The out come of the investigation is in



accordance with the reports of Kumar and Sangappa (1984) and Sachin and Lal (1990) who observed the insecticidal and antifeedant property of neem against more than 200 species of insects of several orders. The effectiveness of Nimbecidine and NSKE (5%) is in accordance with Hanapur and Nandihalli (2004) in potato.

In present findings the effectiveness of pongamia oil @ 2 per cent was in accordance with Eswara Reddy and Srinivasa (2001) who reported that spraying of pongamia oil @ 2 per cent resulted in lowest fruit borer damage with highest yield in brinjal. In the present experiment, application of neem cake once at 30 DAP proved effective compared to split application of neem cake in three doses at 30, 50 and 70 days after planting. That might be due to the inadequate moisture in the soil during subsequent application of neem cake in split dose. The effectiveness of neem cake in managing *L. orbonalis* was due to release of phenolic compound during the decomposition of neem cake. This might had boosted the plant defense mechanism against the borer and ultimately contributed towards lower infestation as reported by Alam *et al.* (1979).

Among different biorationals tested, Nimbecidine and NSKE @ 5 per cent recorded higher tuber yield of about 35.82 and 33.58 q/ha, respectively (Table 2). The higher effectiveness of neem products may be due to the insecticidal and strong antifeedant activity. In the present investigation, higher efficacy of Nimbecidine against *L. orbonaIis* was in accordance with the findings of Srinivasan and Sundarbabu (1998) who, were of the opinion that neem based products were comparable or better than endosulfan in controlling *L. orbonaIis.* The efficacy of NSKE @ 5 per cent is in conformity with reports of Hanapur and Nandihalli (2004) and Rosaiah (2001) who reported the higher efficacy of NSKE @ 5 per cent in managing *L. orbonaIis.* The spraying of pongamia oil @ 2 per cent and application of neem cake once @ 240 kg/ha were in the next order of effectiveness against *L. orbonaIis* which recorded the tuber yield of 30.91 and 28.07 q/ha, respectively. These results were in accordance with Eswara Reddy and Srinivasa (2001). Among different biorationals, NSKE @ 5 per cent recorded highest B: C ratio (6.78) followed by pongamia oil (3.21). These two botanicals are cheap compared to other biorationals.

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REFERENCES

Alam, M.M., Khan, A.M. and Saxena, S.K. (1979). Mechanism of control of plant parasitic nematodes as a result of the application of organic amendments to the soil (V). Role of phenolic compounds. *Indian J. Nematology*, 9: 136-142.

Eswara Reddy, S.G. and Srinivasa, N. (2001). Efficacy of botanicals against brinjal shoot and fruit borer, *Leucinodes orbonalis* Guenee., Proc. of Second National Sym. on Int. Pest Management (IPM) in Horti. crops: New Molecules, Biopesticides and Environment, Bangalore: pp. 11-13.

Hanapur, R.H. and Nandihalli, B.S. (2004). Bio-efficacy of certain insecticides and botanicals against the potato shoot borer, *Leucinodes orbonalis* Guenee. *Karnataka. J. Agric. Sci.*, **17**: 602-603.

Kumar, A.R.V. and Sangappa, H.K. (1984). A note on the performance of plant products in control of gram caterpillars in Bengal gram. *Curr. Res.*, **13**: 38-40.

Nandihalli, B.S., Kuberappa, G.C. and Viswanathappa, K.R. (1996). Survey of insect pests of potato in Hassan, Karnataka. *Mysore. J. Agric. Sci.,* **30**: 138-141.

Niranjanmurthy, P. and Nandihalli, B.S. (2003). Crop loss estimation caused by *Leucinodes orbonalis* Guenee. in potato. *Pest Management In Horticultural Ecosystem*, **9**: 59-62.

Sachin, J.N. and Lal, S.S. (1990). Role of botanical insecticides in *Helicoverpa armigera*, management in pulses. Proc.of sym. on botanical pesticides in IPM, Rajamundry, pp. 261-269.

Srinivasan, G. Sundarababu, P.C. (1998). Management of brinjal shoot and fruit borer *Leucinodes orbonalis* Guenee (Lepidoptera: Pyralidae) using neem products and insecticides. Proc. of First Nat. Sym. on Pest Management in Hortl Crops, IIHR, Bangalore, pp. 87-93.

Urs, K.C.D. (1987). Prospects of indigenous plant products as future alternative to conventional pesticides. Proc. Sym. on alternative Insecticides, pp. 195-202.

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