T5 : Abamectin@0.5ml/lit	4.30 (2.05)[e]	59.66	4.11 (2.00)[e]	60.85
T6:Wettable sulphur@3g/lit	1.46 (1.15)[a]	86.42	1.13 (0.94)[a]	89.39
T7:Dicofol@4ml/li	1.47 (1.16)[a]	86.28	1.15 (0.95)[a]	89.20
T8:Triazophos@2ml/li	2.80 (1.65)[C]	73.68	2.48 (1.56)[C]	76.37
T9:NSKE 5%	3.96 (1.96)[d]	62.90	3.73 (1.89)[d]	64.58
T10:*Ocimum sanctum* extract 10% (Aqueous leaf extract)	4.47 (2.09)[f]	58.03	4.31 (2.05)[f]	58.98
T11:Vitex negundo extract 10% (Aqueous leaf extract)	5.17 (2.26)[h]	51.37	4.97 (2.21)[h]	52.57
T12: Lippia nodiflora extract 10% (Aqueous leaf ectract)	5.32 (2.29)[i]	49.93	5.08 (2.24)[i]	51.51

*Each value is the mean of three observations at fortnightly intervals
*Figures in parantheses are square root transformed values
*In a column, means followed by common letter(s) are not significantly different at P=0.05% by DMRT

Comparative Toxicity of Two Pesticides to Adults of *Coccinella septempunctata* Linn. (Coleoptera:Coccinellidae)

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Coccinella septempunctata Linn has got the distinction of being successful insect predator throughout the world by reducing the aphid population in agroecosystem (Gour and Pareek, 2003. Soni et al., 2004). Therefore, this predator has received maximum attention of researchers and efforts are taken to protect this bioagent from pesticide exposure which have become an important part of modern agriculture. Therefore, to assess the selectivity of two commonly used pesticides in apple orchards in Kashmir, the present work was undertaken.

Adults of *C. septempunctata* were collected from mustard, cabbage and wheat crops grown in fields at Shalimar campus, SKUAST-K and taken to the Toxicology Laboratory, Division of Entomology and kept in cages (25 x

20 x 20 cm). Flowering shoots of mustard infested with *Lipaphis erysimi* (K.) and Brevicoryne *B. brassicae* (L.) were provided as food for adults. Leaves of mustard with their petioles dipped in water were provided for egg laying. Eggs laid on the underside of leaves were removed from the cages and kept in petriplates. After egg hatching, the grubs were reared on *B. brassicae* till pupal stage. After emergence of adults, they were again reared on *B. brassicae.* In this way a sufficient culture of test insects (adults) was maintained. Active and healthy adults of uniform size were selected for testing against the different concentrations of pesticides for working out comparative toxicity. Technical grade fenazaquin and quinalphos used in present investigation were supplied by Fungicides India Limited, Sheikh Bagh, Srinagar and Syngenta India Limited, Mumbai, respectively.

Concentrations were followed in geometric progression with 0.10, 0.050, 0.025, 0.0125 and 0.006 per cent for quinalphos and 0.016, 0.008, 0.004, 0.002 and 0.001 per cent for fenazaquin were prepared in distilled acetone using technical grade pesticides. Glass petridishes (100 x 17 mm) were uniformly sprayed with different pesticides under Potter's tower of Burkard Instruments, Buckinghamshire, England at a constant pressure of 1 kg/ cm^2. One ml of each pesticide concentration (0.5 ml in lower dish and 0.5 ml in upper dish) was used for each spray. Each treatment was replicated thrice. Control was also maintained with each treatment to record the natural mortality using acetone only. Adults were released in each pair of petriplates. and were allowed to remain in contact with the film to ensure sufficient exposure. Adults were then transferred to the untreated petridishes and were offered food as aphids (*B. brassicae*) on small cabbage leaves. These petridishes were then kept in the B.O.D. incubator at 25 ± 1^0C and 70 ± 5 r.h. The mortality counts were recorded after 24, 48 and 72h. Moribund adults were counted as dead.

For working out the toxicity, the percentage mortalities were corrected by using Abbott's (1925) formula. The data thus obtained were subjected to probit regression analysis (Finney, 1971) and LC_{50} values thus worked out of adults. The heterogeneity of the data were checked by working out χ^2 values and subsequently comparing them for significance at P = 0.05 per cent.

The two pesticides were highly toxic to the adults of *C. septempunctata* Toxicity of fenazaquin against adults of *C. septempunctata* in 72h revealed that fenazaquin was extremely toxic with LC_{50} of 0.0123055 per cent. The lower and upper fiducial limits at 95 per cent confidence were found to be 0.00740146 and 0.0204589, respectively. A χ^2 value of 0.3963 indicated that the data were significantly homogenous at P = 0.05. However, comparative toxicity or quinalphos against adults of *C. septempunctata* in 72 hours revealed that quinalphos was moderately toxic with LC_{50} of 0.0453297 per cent. The lower and upper fiducial limits at 95 per cent confidence were found to be 0.0301508 and 0.0681241, respectively. χ^2 value of 0.9094 indicated that the data were significantly homogenous at P

= 0.05. Thomas and Phadke (1991) reported that quinalphos was less toxic to all the stages of the coccinellid than chlorpyrifos. However, Shukla *et al.* (1994) reported quinalphos, monocrotophos and parathion-methy1 toxic to *C. septempunctata* while malathion and endosulfan comparatively safer.

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Table 1. Effect of two pesticides on adults of the coccinellid

Pesticide	Conc. (%)	Corrected Percentage Mortality	Log dose x 10^3	Regression equation Y=y+b(x-x) + Fiducial limits	LC_{50} percent + $\chi 2$
	0.016	54.54	1.204		
Fenazaquin	0.008	44.54	0.903		
	0.004	27.27	0.602	Y=4.6786+1.1626(x-0.8137)	0.0123055
	0.002	17.26	0.301	0.0204589	0.3963
	0.001	2.72	0.00	0.00740146	
	0.00	—	—		
	0.100	67.28	2.000		
	0.050	56.37	1.698		
Quinalphos	0.025	38.16	1.397	Y=4.7281+1.9611(x-1.4956)	0.0453297
	0.0125	18.21	1.096	0.0681241	0.9094
	0.0062	4.58	0.792	0.0301508	
	0.00	—	—		

Y = Probit kill

X = Log concentration x 10^3

LC_{50} = Concentration calculated to give 50 per cent mortality

Occurrence of Citrus Looper, *Anacamptodes fragilaria* Grossbeck (Geometridae : Lepidoptera) in Acid Lime Nursery in Coastal Andhra Pradesh

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Citrus cultivation occupies third position after mango and banana in India. India ranks sixth in the production of citrus fruit in the world. Of the various types of citrus fruits grown in India, orange (mandarin or santra), sweet orange (mosambi, malta or satgudi) and lime/lemon are of commercial importance. Lime or acid lime is also commercially known as 'Pati lime' or 'Kagzi lime'. The area under citrus cultivation is increasing especially in Andhra Pradesh and Maharashtra. Acid lime is one of the commercial crops grown widely in Nellore, which is the southern most coastal district that lies approximately between 13 30' and 15 6' of Northern latitude and 70 5' and 80 15' of Eastern latitude.

A study was conducted at Citrus Research Station, Petlur, Nellore, India during 2006 – 07 to observe the major insect pests that infest acid lime seedlings in the nursery of acid lime. Seedlings are preferred in acid lime for commercial plantations. Planting of healthy and uniform seedlings are recommended to get regular harvests of high quality fruit. Citrus butterfly, *Papilio demoleus* L. and leaf miner, *Phyllocnistis citrella* Stainton were the major pests recorded during the study. Minor pests included thrips and mites. Another important pest that was observed in considerable numbers was citrus looper, *Anacamptodes fragilaria* Grossbeck. The larvae were abundant in the nursery during January feeding voraciously on young flush resulting in severe defoliation. The looper damage in the nursery was to the extent of 20-30% and each twig attacked was completely defoliated. The stick like larvae were carefully removed and brought along with the feed and reared until pupation and emergence of adults. The larva had no prolegs in the middle and hence moved in characteristic looping fashion. Adults were preserved and compared to the preserved specimens and identified as *Anacamptodes fragilaria* Grossbeck. The looper is also called as Kiawe moth or Koa haole looper. Loopers occur in most citrus-growing areas and mainly consume new growth flushes, but also feed on blossoms and young fruit; they rarely damage mature fruit. Very young larvae typically feed on lower leaf surfaces along the leaf margin. Mature larvae, which are about 1.5 inch (3.7 cm) long, eat making holes in leaves or consume them entirely. The occurrence of the looper was not regular in Nellore, which appeared to be high during the present study. Hence there is a need to keep a watch on this relatively minor pest before it becoms a major problem. Serious damage in California's Redlands area was reported due to citrus looper, where over 350 larvae per tree