DISSIPATION STUDIES ON CERTAIN INSECTICIDES ON LUCERNE

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Lucerne (*Medicago sativa* L.) is one of the important fodder crops grown globally, with a production of around 436 M. tons grown for meeting the feed requirement of cattle and contains 15% of crude protein and 72% dry matter and is popular as "Queen of fodders" or "Green gold". With high digestible fiber and high protein content 5 times higher than sorghum, it deserves more attention than any other fodder crop In India, lucerne is primarily concentrated to the states of Gujarat, Haryana, Punjab, Madhya Pradesh, Uttar Pradesh and Maharashtra in an area of 1000 hectares(Patel *et al,* 2003). In Andhra Pradesh, Tamil nadu and Karnataka, the variety Co – 1(P) is commonly cultivated with an annual green fodder yield of about 60-80 tonns/ha whereas in the states like Gujarat, Rajasthan and Madhya Pradesh the varieties Anand-1 and 2 are cultivated with an annual green fodder yield of about 80-95 tonns/ha respectively.

Despite its potential, the actual yield are not being realized due to several constraints in the cultivation of Lucerne including pests. Aphids i.e. Pea aphid, *Acyrthosiphon pisum* Harris, Blue alfalfa aphid *Acyrthosiphon kondoi* Shinjii, Spotted alfalfa aphid *Therioaphis trifolli* F, Cowpea aphid *Aphis craccivora* Koch., Jassids *Empoasca spp,* gram pod borer *Helicoverpa armigera*, leaf eating caterpillar *Spodoptera litura*, alfalfa weevil *Hypera postica* are the common pests causing heavy damage to Lucerne.The aphids *Acyrthosiphon pisum* Harris, *Acyrthosiphon kondoi* shinjii and *Therioaphis trifolli* F. are responsible for causing both qualitative and quantitative losses in Lucerne and contribute to almost 30% damage and yield loss .

To tackle this chemical control methods are one of the main control strategies in IPM. Indiscriminate use of pesticides not only causes severe ecological consequences like destruction of natural enemy fauna, effect on non target organisms but also directly affect in the form of residues. Hence the efficacy of different insecticides was evaluated during 2011-12 and the dissipation pattern of three effective treatments *viz.,* spirotetramat 240 SC at 120 g a.i. ha^{-1}, thiacloprid 240 SC at 120 g a.i. ha^{-1} and imidacloprid 240 SC at 200 g a.i. ha^{-1} was studied by collecting lucerne samples at 0, 1, 3, 5, 7, 10 and 15 days after spraying and analyzed.

Sample Collection: The Lucerne samples of 500 g (leaves stem and flower) were collected at 0, 1, 3, 5, 7, 10 and 15th days after spray randomly from each plot for further sample processing.

The residues of Spirotetramat and its metabolite enol,thiacloprid and Imidacloprid were estimated using HPLC Shimadzu LC-20AT **operated at flow of** 0.500 ml min^{-1} using PDA (Photo Diode Array) detector with mode SPD-M 20A at 270 nm wavelength and the retention times of ranjing fpoem 12.5 to 7.5 10.5mints

Results of Fortification and Recovery Studies:

Name of the pesticide	Recovery per cent for 0.1 ppm	Recovery per cent for 0.01 ppm
Spirotetramat	88.0	85.0
Spirotetramat enol	85.13	85.0
Thiacloprid	86.0	85.0
Imidacloprid	88.3	85.6

Table.1 Dissipation of Spirotetramat (120 g a.i. ha-1)

Days after treatment	Residues mg kg^{-1}	percent Dissipation
	Mean	
0	0.55	-
1	0.41	25.45
3	0.30	45.45
5	0.17	69.09
7	0.03	94.54
10	BDL	100
15	BDL	100

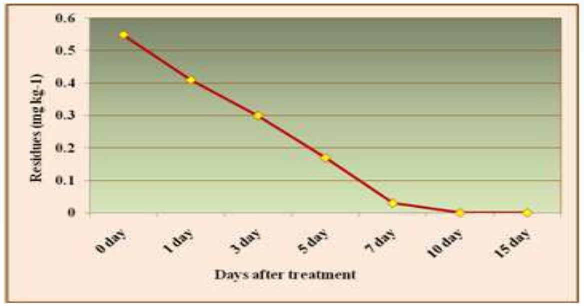

Figure 1.Dissipation of spirotetramat (120 g a.i. ha-1) residues in lucerne.

Table 2 Dissipation of Thiacloprid (120 g a.i. ha-1)

Days after treatment	Residues mg kg^{-1}	Percent Dissipation
	Mean	
0	1.62	-
1	0.74	54.32
3	0.35	78.39
5	0.17	89.50
7	0.04	97.53
10	BDL	100
15	BDL	100

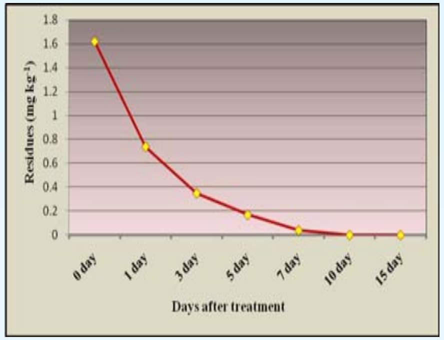

Figure.2 Dissipation of thiacloprid (120 g a.i. ha-1) residues

Table 3.Dissipation of Imidacloprid (200 g a.i. ha^{-1})

Days after treatment	Residues mg kg^{-1}	percent Dissipation
	Average	
0	0.47	-
1	0.30	36.17
3	0.16	65.95
5	0.03	93.61
7	BDL	100
10	BDL	100
15	BDL	100

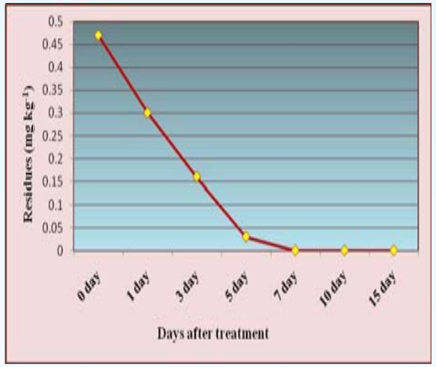

Figure.3 Dissipation of imidacloprid (200 g a.i. ha^{-1}) residues

The residues recorded for spirotetramat at 120 g a.i. ha^{-1} were found to be 0.6, 0.39, 0.20, 0.17 mg kg^{-1} at 0, 1, 3, 5 and recorded BDL at 7 and 10 days. The half life value (RL_{50}) and waiting period (T_{tol}) were 1.65 and 5.13 days, respectively. (Tabl and fig 1). Thiacloprid at 120 g a.i. ha^{-1} recorded residues of 1.75, 0.73, 0.47, 0.07, 0.02 mg kg^{-1} at 0, 1, 3, 5, 7 and reached BDL at 10 days. The half life value was worked out to be 1.4 days and the waiting period was 3.69 days.(Tabl and Fig 2). Imidacloprid at 200 g a.i. ha^{-1} recorded residues of 0.47, 0.32, 0.05, 0.03 mg kg^{-1} at 0, 1, 3, 5 and reached BDL at 7 and 10 days. The half life value was worked out to be 1.4 days and the waiting period was 3.69 days.(Table and Fig 3). Hence, it can be concluded that usage of pesticides should be restricted and care should be taken before feeding the cattle with such fodder.

Among the three insecticides analyzed for the dissipation, imidacloprid at 200 g a.i./ha dissipated quicker from the initial deposit of 0.47 to 0.05 mg/kg by 3 days with a dissipation percentage of 89.36. The waiting periods for spirotetramat, thiacloprid and imidacloprid were worked out to be 9.37, 3.81 and 4.63 days whereas the half lives were 3.63, 1.39 and 3.38 days respectively. From these results it can be concluded that these newer molecules with good efficacy can be used against the pests of lucerne and the fodder can be safely fed to cattle with a waiting period of 10 days. Imidacloprid and thiacloprid are considered to be safe for use on lucerne because of their faster dissipation/degradation.