

*Full Length Research Paper*

# Eradication of *Lantana camara* L. by inhibition of pollen germination using weedicides

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*Lantana camara* L. belonging to family Verbenaceae is a major weed in many regions where it invades natural and agricultural ecosystems and special interests due to allergenicity. It is a noxious weed worldwide distribution and tops the tenth most dangerous weeds in the world. All the parts of the plant contain toxic substance such as lantadene, a polycyclic triterpenoid identical in structure with rehmamic acid. Phylloerythrin has photosensitizing properties. Thus, the plant has aroused human disliking and attempts are being made for its eradication or control, because it competes with more desirable plants. Survey through literature reveals that the considerable work is available on occurrence, biological and chemical control and allelopathic action of *L. camara*. In the present study effect of different weedicides namely Kay D (2, 4 – D), Gold line (Oxyflourfen) and Glymac (Glyphosate) were studied on *in vitro* germination of pollen grains and pollen tube growth. Kay D, Gold line and Glymac showed stimulatory effect on germination of pollen grains and pollen tube growth. Observations showed that among all the weedicides Glymac was the most efficient to inhibit the pollen germination and tube growth followed by Gold line and Kay D. All the weedicides showed stimulatory effect on pollen germination and tube growth at lower concentrations and they gradually inhibit pollen germination at higher concentrations. The lethal doses for Kay D, Gold line and Glymac were 200 ppm, 80 ppm and 40 ppm respectively. It can be concluded that *L. camara* pollen and other parts of the plant are highly allergic and causes health hazards to human as well as to animals. Thus controlling and eradication of this weed by spraying the weedicides directly on the inflorescence and flower may provide an effective way.

**Key words:** Kay D, Glymac, Gold line

## INTRODUCTION

*Lantana camara* L. belonging to family Verbenaceae is a major weed in many regions where it invades natural and agricultural ecosystems and special interests due to allergenicity. It is a noxious weed. It is distributed worldwide and tops the tenth most dangerous weeds in the world. In India 7 – 8 species of *Lantana* are found of which some important species are *L. camara*, *L. indica*, *L. trifolia*, *L. canulata*.

All the parts of the plant contain toxic substance such as lantadene which is a polycyclic triterpenoid identical in structure with rehmamic acid and contain. It contain Phylloerythrin, a photosensitizing properties. Thus, the plant has aroused human disliking and attempts are being made for its eradication or control, because it competes with more desirable plants also. Acute poisoning by ingestion in animals, takes the form of “pink nose” with

reddening of the muzzle and conjunctivitis and severe gastroenteritis with death in as short time as 3 – days. In chronic poisoning, signs of photosensitization appear if the animal is exposed to sunlight. Areas of inflammation extend to the adjacent mucous membranes of the mouth and nasal passages. Affected animals refused food, drool saliva from the mouth and lose weight. In humans contact with this prickly stemmed shrub is reported to cause dermatitis.

Survey through literature revealed that considerable work is available on occurrence, biological and chemical control and allelopathic action of *L. camara*. In this study effect of different weedicides namely Kay D (2, 4 – D), Gold line (Oxyflourfen) and Glymac (Glyphosate) were studied on in vitro germination of pollen grains and pollen tube growth.

## MATERIALS AND METHODS

The flowers of *Lantana camara* were collected in the morning at 8 O clock. By tapping the flowers, pollen grains were collected in the different concentrations of weedicides to observe the pollen germination and pollen tube growth.

Tap water, distilled water and different concentrations of sucrose (100 ppm to 6000 ppm) solution were used as a medium separately to determine the maximum germination percentage of pollen grains. The medium that gave maximum germination percentage was used for preparation of various concentrations of different weedicides solutions. Weedicides belonging to different groups were selected to study their inhibitory effect on *in vitro* pollen germination and pollen tube growth. Different weedicides namely Kay D (2, 4 – D), Gold line (Oxyflourfen) and Glymac (Glyphosate) were selected for aforesaid study. Stock solution of 1000 ppm of all the three weedicides was prepared using distilled water. From the stock solution different concentrations were prepared using distilled water.

The pollen germination and pollen tube length were calculated at each concentration of freshly prepared aqueous solution of Kay D, (1 ppm to 300 ppm), Gold line (1 ppm – 200 ppm) and Glymac (1 ppm – 100 ppm) after four of sowing of pollen grains.

## RESULTS AND DISCUSSION

In this study, pollen germination was observed after one hour of hydration. In tap water and distilled water the germination percentage was considerably low being 29.31 and 20.07 with the pollen tube length of 16.50 and 11.25  $\mu$  respectively in the other media the percentage

of germination and pollen tube length decreased even more than that tap water and distilled water. The pollen germination percentage was more (29.31) in tap water than in distilled water (20.07).

The germination percentage in different concentrations of sucrose solution (1000 ppm to 40,000) was very poor in range of 19.6 to 0.63. Similar results were also reported by Paithankar in 1993 while studying the *in vitro* pollen germination in *Parthenium hysterophorus*. Joshirao (1983) in *Datura* and *Argemone* obtained less percentage of pollen germination due to bursting of pollen grains very often in sucrose solution.

In Kay D gradual decrease in percentage of pollen germination with an increase in concentration was observed. The percentage of germination range in 10 ppm to 175 ppm was 20.34 to 0.8 respectively whereas in control it was 29.31%. The pollen tube length also decreases gradually as concentration increases. The pollen tube length in control and 175 ppm was 16.5 and 0.8  $\mu$  respectively.

In Gold line at 1 to 70 ppm of concentration the percentage of germination was different being in the range of 18.64 to 1.43 whereas in Glymac percentage of germination at 1 ppm to 30 ppm was in the range of 12.11 to 1.97 respectively. The pollen tube length was also decreases considerably with an increase in concentration of all weedicides. At higher concentrations of Kay D, Gold line and Glymac the percentage of germination reduced gradually to zero. Thus the higher doses of weedicides inhibited pollen germination.

At 200 ppm of Kay D, 80 ppm of Gold line and 40 ppm of Glymac pollen grains did not germinate at all, hence these doses of respective weedicides were considered as inhibitory for pollen germination (Table 1).

Glymac was found to be most efficient weedicides as compared to any other media, though it was stimulatory at lower concentration. The complete inhibition of pollen germination and tube growth occurred at 40 ppm. The inhibitory effect of these weedicides was due to change in osmotic pressure, pH medium and its effect on primary constituent of pollen germ pore or pollen tube tip (Gentle and Gallagher, 1972) treated 32 commercial formulations of pesticides including 2, 4-D *in vitro* pollen germination in *Petunia hybrida* and reported that majority of them reduced the pollen germination and few of them totally inhibited germination.

Similarly the inhibitory results on pollen germination were also reported by Chancy et al. (1975) and Korden and Mumford (1977) on Lily and *Impatiens hostii* pollen respectively while studying the effect of aflatoxin B1 and mircicanin on pollen germination and tube growth.

Thus, it was evident from the results that only small traces of all weedicides except Kay D were required to inhibit the pollen germination and tube growth.

**Table 1.** Effect of different media on pollen germination and pollen tube length of *Lantana camara*.

Sr. No.	Medium or weedicide	Concentration (ppm)	Pollen tube length ( $\mu$ )	Pollen germination (%)
1	Tap water (Control)	-	16.5	29.31
2	Distilled water	-	11.25	20.07
		1000	11.57	19.60
		2000	9.00	16.21
		5000	6.75	12.11
		10000	4.49	8.80
3	Sucrose	20000	2.24	6.14
		30000	1.87	2.77
		40000	0.56	0.68
		50000	0.00	0.00
		1	14.25	18.64
		5	9.75	17.69
		10	9.00	16.63
		20	6.75	13.91
4	Gold line	30	4.50	11.48
		40	4.12	9.41
		50	2.99	7.55
		60	1.87	3.88
		70	0.70	1.43
		80	0.00	0.00
		10	11.25	20.34
		25	10.50	16.79
5	Kay D	50	9.37	13.57
		75	6.75	8.96
		100	4.12	7.63
		125	2.62	4.62
		150	1.87	2.79
		175	0.69	0.89
		200	0.00	0.00
		1	6.75	12.11
6	Glymac	5	5.20	6.68
		10	3.75	5.86
		20	2.49	3.62
		30	0.69	1.97
		40	0.00	0.00

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