RESEARCH ARTICLE

The impact of Herbicide Glyphosate on the biodiversity with special reference to Seed germination and early seedling growth of weed *Hyptis suaveolens* l.

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ABSTRACT

Weed is plant is a growing where it is not desired; it interferes with utilization of land and water resources and affects human and animal welfare. Unwanted vegetation flourish in the field crops, forestry, industrial sites, railway lines air fields, water ways and non cropped lands create several problems. The weed *Hyptis suaveolens* L. belonging to family Lamiaceae growing in Maharashtra especially in vidarbha region and found growing luxuriantly on boundary of crop fields, on sides of railway tracks and road sides. The seeds of plant were collected from plant already growing in fields, were allow to grow with aqueous concentration of glyphosate herbicide (weedicide) at various concentration like 1000-50000 ppm. No lethal dose could be determined upto 50000 ppm. Morphological changes like stunted growth and the inhibition in photosynthetic activity was observed.

Key words: *Herbicide (herbicide (weedicide)), Glyphosate, Hyptis suaveolens* L.

INTRODUCTION

Plants on the earth is a great asset to mankind, out of 2,50,000 plant species present in the world, nearly 200 species are found to be prominent weed causing severe losses in agricultural systems. Weeds are unwanted and undesirable plant. It grows where it is not desired, it interfere with utilization of land and water resources and affects human and animal welfare. Unwanted vegetation flourish in the field crops, forestry, industrial sites, railway lines air fields, water ways and non cropped lands create several problems. Great crop losses also occur due to weed about 20 to 100 percent. The natural growth aggressiveness and high adaptability of weed always makes them winners in the competition race.

Employing chemicals for weed control referred as chemically weed control method, the chemicals used commonly referred as herbicide (weedicide) or agrochemicals, it constitute the principal component of weed management. Herbicides are used to limit reduction in crop yield and quality due to weed competition, yield contamination and interference with harvesting. Herbicide use has undoubtedly contributed to crop yield increases and the efficiency of production.

Herbicide (weedicide) Glyphosate is a non-selective, systemic, broad spectrum herbicide produced by U.S. and contain the active ingrediants, glyphosate [N-(Phosphonomethyl) glycine]. Glyphosate kill the target organism by inhibiting the enzyme and that can control most annual and perennial plants. Glyphosate is strongly adsorbed to soil particles, which prevents it from excessive leaching or from being taken-up from the soil by non-target plants. It is degraded primarily by microbial metabolism, but strong adsorption to soil can inhibit microbial metabolism and slow degradation.

Glyphosate is extensively tested for health and safety, low-cost, effective weed control, economically and effectively controls broadleaf weeds growing in between rows of crop. By keeping these properties of glyphosate in mind this work has been undertaken.

MATERIALS AND METHODS

The seeds of *Hyptis suaveolens* L. were collected from plant already growing in fields. In this study healthy and proximate equal-sized seeds were selected. The seeds were washed in distilled water and allow soaking in distilled water for 24 hours and again washed with distilled water and kept the seeds for germination in petridishes lined with moistened double layer filter paper under laboratory condition. Germination of controlled seeds was observed for seven days along with seed treated with aqueous concentration of herbicide (herbicide (weedicide)) ranging from 50 to 1000 ppm were used, 1000 ppm does not found lethal, higher concentration were tried to determine lethal does up to 50000 ppm like 1000, 5000, 10000, 20000, 30000, 40000 and 50000 ppm. Morphological responses were recorded daily till the germination ceases in control and treated seeds. The emergence of radical considered as the criterion for germination.

RESULTS AND DISCUSSION

The results clearly demonstrate that glyphosate has a detrimental effect on the germination of seed. A negative correlation was observed between glyphosate doses and the germination percentage. The germination percentage of the seeds treated with glyphosate was rather different from the control group. The highest germination percentage was observed in the seeds of the control group (in proportion as 91%). The lowest germination rate was observed at 50000ppm dose of glyphosate. Glyphosate treatment caused a significant decrease in the germination percentage at all the doses of 1000, 5000, 10000, 20000, 30000, 40000 and 50000ppm doses of glyphosate caused 83.2 %, 82.8%, 82.6 %, 80.2 %, 77.2%, 76.6% and 72.3%, (Table 1 and Fig. 1) decreases of seed germination, respectively. These results showed that the effects of glyphosate on the germination percentage and shows morphological peculiarities in the seedling. Gradual decrease in the length of seedling of colour change of cotyledon to pinkish was noticed. No twisting of seedling nor any swelling on the seedling were observed at any concentration of glyphosate.

Table 1: Effect of various doses of glyphosate on the germination percentage of *Hyptis suaveolens* L. seeds.

Sr. No	Concentration in ppm	Germination Percentage
01	Control	91.0
02	1000	83.2
03	5000	82.8
04	10000	82.6
05	20000	80.2
06	30000	77.2
07	40000	76.6
08	50000	72.3

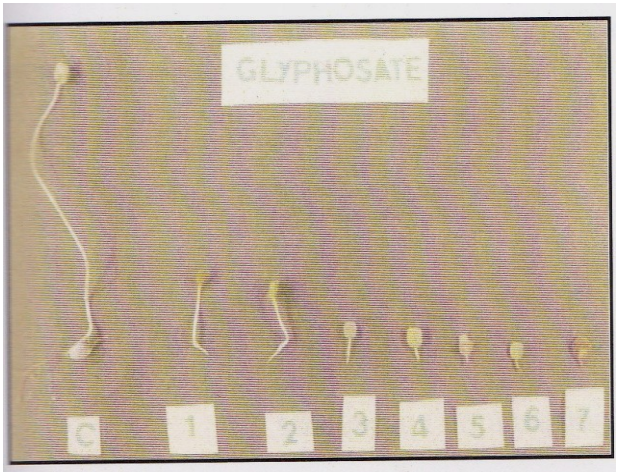

Fig. 1: Progressive inhibition of growth in seeds of *Hyptis suaveolens* L. treated with glyphosate

Glyphosate application fairly reduced the percent germination, compared to untreated seeds and also showed morphological changes in cotyledon colour and growth of seedling. Similar results were observed by Yenish and Young (2000), investigated the effects of glyphosate on seed germination and seedling quality in *Triticum aestivum.*

Klingman and Murray (1976) observed that glyphosate and paraquat affects germination of seeds of turfgrasses. This information is parallel with the other glyphosate activity. In a similar study, Mclaren and Don (2004) investigated the effect of glyphosate in barley crops.

Kültigin *et al.* (2011) reported toxic effects on seed germination of *Allium cepa* as investigated in the present study. Results of present investigation revealed that colour of cotyledon changes green to yellowish and later on pinkish. Similar pattern of colouration was also reported by Wong (2000). Baig *et al.* (2003) demonstrated that preharvest applications of glyphosate affect emergence and seedling growth of field Pea (*Pisum sativum*). In the present investigation growth of seedlings was reduced and stunted.

The results of the present study indicated that glyphosate caused to significant toxic effects in seed germination and early seedling growth of *Hyptis suaveolens* L.

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