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INTEGRATED WEED MANAGEMENT BY AGRO-CHEMICAL 2, 4-D IN AGRICULTURAL LAND OF CHANDRAPUR DISTRICT, MAHARASHTRA.

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ABSTRACT: Chandrapur district of Maharashtra state is the most popular for the forest; despite of that agriculture continues to be the most important sector of villagers for their livelihood and generating economy, as well as providing employment to the labors and farmers. But now a day's weed invading largely in agriculture land and at the present movement weeding is the drudgery for farmers due to availability of agriculture labour, expensive, time consuming by hand weeding. Research in weeding has investigated various techniques varying from mechanical, chemical and biological techniques. Despite the fact that chemical method have produced excellent results. The agrochemical 2, 4-D (2,4- Dichlorophenoxyacetic acid) proved to be most efficient weed controller in agriculture land of broad leaved weeds, the agrochemical 2, 4-D has low to moderate acute toxicity towards animals and humans

Key words: - weed management, agrochemical, 2, 4- Dichlorophenoxyacetic acid, weed.

INTRODUCTION :

Weed invades the crop field simultaneously and continue to be an important constraint in crop production, "Weeds are the plants, which grow where they are not wanted." Jethro Tull (1731) it creates new areas for cultivation of economic crops and losses also occur due to weed about 20 to 100 percent. Due to its adaptability and it grows anywhere and shape themselves under changed circumstances. Weed and crop plants are almost similar in demanding certain things from the environment for their growth. It makes competition race with crop plants and grow aggressively with high adaptable and always makes winner. Weeds harbor insects and pests during off season and then later attack to the crop field after sowing and damage them. The farmers continue to experience heavy losses in crop yield due to weed interference. However the yield losses in crops due to weed and makes economic loss has been estimated in India, these cost were much higher. Weed cost Indian agriculture production over USD 11 billion each year (Gharde et. al., 2018). Indian agriculture which is more than combined losses caused by insects, pest and diseases. Despite the good efforts made in research and extension in the field of weed science.

Traditional approach to control weed is manual and mechanical methods. If farm size is small then weeds are removed manually. This practice is less common as a result labor migrating ti cities and rising wage cost. Manual method by using hand weeding, digging, cheeling, sickling and mowing and mechanically by using tillage, hoeing, inter row cultivation, Eco fallow system, burning, flooding, mulching like this way weed control were taking place (Mandumbu *et al.*, 2011). Agricultural weeds are high consumers of nutrients and are therefore capable of reducing available nutrients for crop growth. Manipulation of fertilizer timing and placement can help reduce weed interference of crops. Heaping manure generates high temperatures

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within the manure heap and is accompanied by the release of toxic gases such as methane and ammonia which will kill weed seeds in the heap, (Rupende *et al.,* 1995). Early planting gives the crop a starting position advantage over the weeds (Mashingaidze and Chivinge, 1998). Early planted crop gets the highest sunshine and temperatures and grows before the first flush of weeds. Crop rotations are a useful tool for weed management (Liebman and Gallandt, 1997). Diversified crop rotations are likely to provide best opportunities for exploiting diverse sets of tactics and ecological processes to suppress weeds (Westerman *et al.,* 2005).

But it is not so effective because it is expensive and time consuming practices. In Zimbabwe, Chivinge (1990) found that small holder farmers spend more than 75% of their time hoe weeding in the peak period of November and February, this includes female members of the family and children who in many cases fail to attend school regularly. An integrated approach to weed management is necessary to effectively control weeds in a less costly and environment friendly manner (Thembani, 2002). And ecologically-based weed management tools (Chauhan and Gill, 2014). The success of biological weed control by insects and pathogens is directly or indirectly acting on crop plants. But by mechanical and biological methods urgent weed management does not take place so there is a need of fast, quick and economically beneficial options, and to consider the potential for integrating them with agrochemical use.

Employing chemicals for weed control referred as chemical weed control method, it commonly uses the chemicals referred as herbicides, weedicides or agrochemicals, it constitute the principal component of weed management. Although the herbicides have been in use for over three decades, use has increased only recently (Yaduraju, 2012), the share of herbicides is nearly 20% and is growing. 2,4-D (2,4-Dichloro phenoxy acetic acid) is a selective systemic post emergence herbicide which effectively controls a wide spectrum of annual broad leaved weeds and grasses in many agronomic and horticultural crops. It is the most widely used herbicide in the world Over 400 herbicides have been developed and registered in the world for weed control in agricultural and non agricultural systems.

Integrated Weed Management (IWM) is the control of weed using different complementary methods within a system rather than relying on a single method. The main aim of IWM is to reduce the selection for the development of resistance to any single method of weed control (Chauhan et. al., 2017). It is with this view in mind that the present investigation done on weed *Hyptis suaveolens* L. belonging to family Lamiaceae which is a very common and obnoxious weed in the Chandrapur district of Maharashtra state.

MATERIALS AND METHODS:

Hyptis suaveolens L. is a weed growing in Maharashtra especially in Vidarbha region of Chandrapur district. It is found growing luxuriantly on boundary of crop fields, on sides of railway tracks in all over India and road sides. In present investigation plants already grown in field were sprayed with aqueous concentration of agrochemical 2,4-D (2,4-Dichloro phenoxy acetic acid) at various concentrations between 100-2500 ppm by aspee-poly sprayer of 1 liter capacity. By making randomly designed plots of size approximately 2/2 square feet and each plot was covered on four sides by card board to avoid the contamination of different concentrations at the evening at low temperature. Spraying of agrochemical 2,4-D (2,4-Dichloro phenoxy acetic acid) was done twice in an hour to make more effective penetration. In evening period herbicide solution reduces the evaporation and consequently more absorption by the plants takes place. Fresh and dry weight of shoot and root of control as well as treated plants were taken to determine the desiccation of plants. Morphological responses were recorded daily till the death of plants.

RESULTS:

Plants sprayed with agrochemical 2,4-D (2,4-Dichloro phenoxy acetic acid) showed morphological changes at 1000 to 2000 ppm concentration, the growth of plant inhibited and stunted as compared to control. The plant showed morphological abnormalities after five days of spraying. The most prominent feature observed was curling nature of leaves, drupping, chlorosis inhibition of lateral root formation and photosynthetic activity inhibited, the leaves crumpled, flower buds .flower buds were dried, stem shows epinastic curvature. The lateral growth and apical growth completely ceased at 2500 ppm concentration. it might be due to the physiological and biochemical toxicity of agrochemical 2,4-D.Therefore the 2500 ppm considered to be the lethal does for the plant *Hyptis suaveolens*.

The fresh and dry weight of shoot and root of treated plants were found to be decreased gradually with the increased dose of agrochemical 2,4-D as compared to control.

DISCUSSION AND CONCLUSION:

The use of Herbicide 2,4-D and its impact on plant induces morphological changes after spray on *Hyptis suaveolens* L. plant such as epinastic curvature of stem and petiole, chlorosis and crumpling of leaves, later on necrosis and then chlorosis of leaves tissue followed crumpling of leaves, drying of flowers, stunted growth of plants and inhibition of lateral roots which resulted in death of plants. After the treatment of 2,4-D plant death occur after 13 days, it might be due to the physiological and biochemical toxicity of 2,4-D similar observations were recorded by several workers including Shabana *et al* (2001). Sanjay kumar and Atul kumar Singh (2010). Curling of leaves due to chlorophyll disintegration or killing of some mesophyll and epidermal cells. The killing of cells might be due to plasmolysis of leaves. Singh *et al* (1987) reported the decrease in chlorophyll content of leaves in rice plant after the treatment of 2,4-D. Some other observed that the higher concentration of 2,4-D inhibites the structure and function of chloroplast. In a weed *Chenopodium album,* 2,4-D affects on chlorophyll activity and leaves showing yellowing, scorching and later necrosis were observed by Jain (1993). The morphological changes noted on the plant vegetative organ, as well as 2,4-D affects on reproductive organ of plant.it might be due to hormonal activity. The effect of 2,4-D on flower buds were noticed earlier by Khosla (1967) in *Cassia tora.* Below the ground i.e. root was shows some morphological responses, inhibition of lateral root formation. Jordan *et al* (1978) reported 2,4-D reduces the length of tap root system in cotton, Donald and Joseph (1989) reported the inhibition of lateral root development in some weed and same result reported in *Chenopodium album,* Jain (1993).

In present study, the reduction in growth of treated plant were confirmed by fresh weight and dry weight of shoot and roots. The fresh weight of plants of all concentration decrease as concretion increase, proportionate the dry weight of shoot and root of treated plants were also observed. These results indicate that the desiccation of plant found progressive with increase in concentration of herbicide.

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Table-Showing effect of various doses of 2,4-D on the weight of the weed.

Agrochemical	Concentration	Shoot fresh weight	Dry weight	Root fresh weight	Dry weight
	Control	27gm	12gm	11gm	5gm
2,4-D	400	18.10	7.00	12.00	4.0
	800	18.00	5.12	11.20	3.20
	1000	17.00	7.10	9.02	2.10
	1500	12.08	4.02	6.00	2.00
	2000	10.09	3.00	3.00	1.02
	2500	6.02	2.10	2.00	1.00

Fig.1 Control, 1, 2, 3 and 4 showing spray application of 2,4-D at 100, 200, 400 and 800 ppm

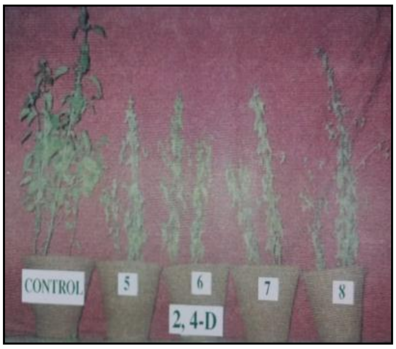

Fig.2 Control, 5, 6, 7 and 8 showing spray application of 2,4-D at 1000,1500, 2000 and 2500 ppm

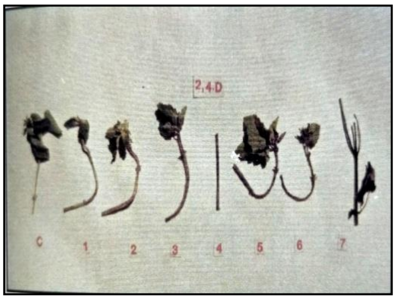

Fig.3 Control, 1,2,3,4,5.6 and 7. stem of plant after spray application of 2,4-D at 200, 400,800,1000,1500 and 2500 ppm respectively.

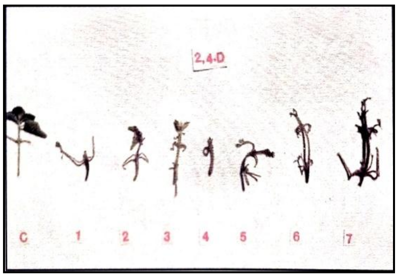

Fig.4 Control, 1,2,3,4,5.6 and 7. Petiole of plant after spray application of 2,4-D at 200, 400,800,1000,1500 and 2500 ppm

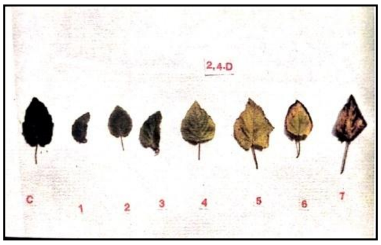

Fig.5 Control, 1,2,3,4,5.6 and 7. Leaf of plant after spray application of 2,4-D at 200, 400,800,1000,1500 and 2500 ppm respectively.

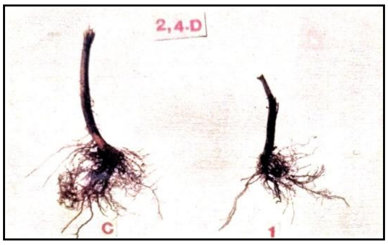

Fig.6 Control, Root of plant after spray application of 2,4-D at 2500 ppm showing inhibition of lateral root formation respectively.

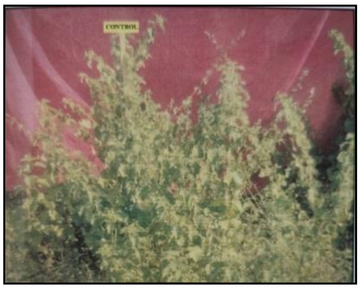

Fig.7 Field photograph of control plant

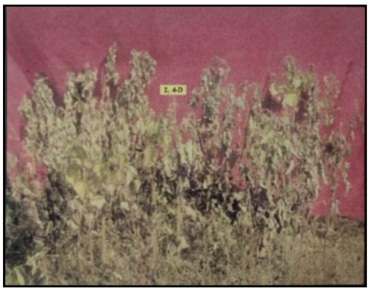

Fig.4 Field photograph of plant after spray application of 2,4-D at 3000ppm