

## Effect of spray application of oxyfluorfen on anatomical characters of *Hibiscus cannabinus* Linn.

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### ABSTRACT

In present study, the herbicidal activities of oxyfluorfen on *Hibiscus cannabinus* Linn. has been studied. The anatomical response might produce some light on the manner by which this compound affected on plant. The plants were sprayed with aqueous solution of different concentrations of herbicide from 100 to 10,000 ppm. This herbicide induced some anatomical changes like proliferation of cambium and phloem in the stem to form large masses of meristematic cells and due to the proliferation of cortical and pith cells after treatment became crushed. In the leaves, desiccation of cells, proliferation of cambium in the midrib region and distortion of vascular elements was common feature observed by the application of oxyfluorfen.

**Key words:** Herbicide, Oxyfluorfen, Anatomical characters, *Hibiscus cannabinus* Linn.

### INTRODUCTION

Plants of *Hibiscus cannabinus* Linn. were raised from seeds collected from naturally growing plants of different places in Nagpur and its environs. They were allowed to grow till they attained the flowering and at this stage plants were sprayed with different concentrations of oxyfluorfen.

The aqueous solution of herbicide ranging from 100 to 5000 ppm was prepared. Ten pots for each concentrations (100 to 2000 ppm) containing 2 to 3 plants were sprayed. If 2000 ppm was found higher; the lower concentrations were tried to determined lethal dose. Asppe- poly sprayer of one litter capacity did spraying. A small quantity of sodium lauryl sulphasate as a surfactant added in the herbicide solution. The Spraying was started in month of October 1996 and same experiments were repeated next year also. Spraying was done twice in an hour to make it more effective in the evening hours, when the wind was slow and temperature comparatively lower than that of the day. This help in less evaporation and more absorption of herbicide solution by the leaves. To avoid contamination of different concentrations of herbicide, cardboard was used at the time of spraying application. Six pots were sprayed with water used as control. Field trials were conducted on naturally growing plants in

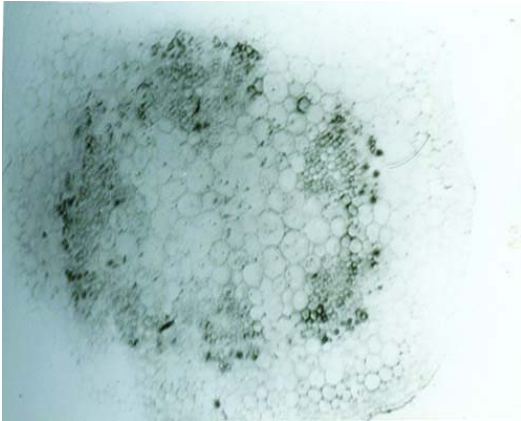
randomly designed plots of size approximately 3:3 feet's.

To study the anatomical changes induced by herbicide, plant parts like root, stem, petiole and leaf of the treated as well as control plants were fixed in F: A: A (Formalin: Acetic acid: Alcohol) solution for 24 hours and stored at 70% alcohol. The plant material were embedded in paraffin wax following customary method. Sections were cut at 6 to 9 microns. They were then stained according to crystal violet – erythrosine schedule and mounted in D.P.X. Microphotograph of various sections of both control and treated plants were taken.

### RESULTS

#### Control

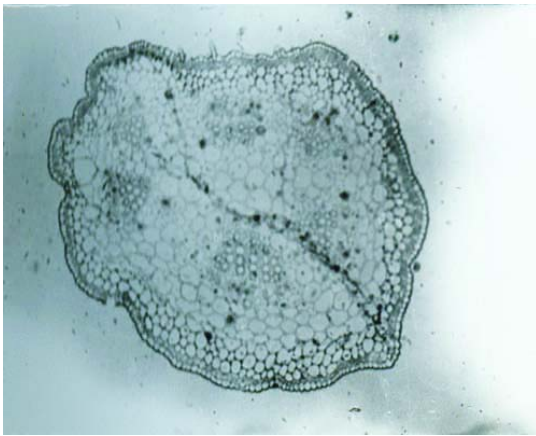
The control stem showed defined single layered epidermis followed by ground tissue. It was divided in to three zones, the outer zone was chlorenchymatous which was made up of 2 to 3 layers of parenchymatous cells containing chloroplast. This zone was followed by 2 to 3 layers collenchymas was immediately followed by 3 to 4 layers of parenchymatous cells. Endodermis and pericycle were distinct. Vascular tissues were arranged in ring and enclose large parenchymatous pith Fig. 1.



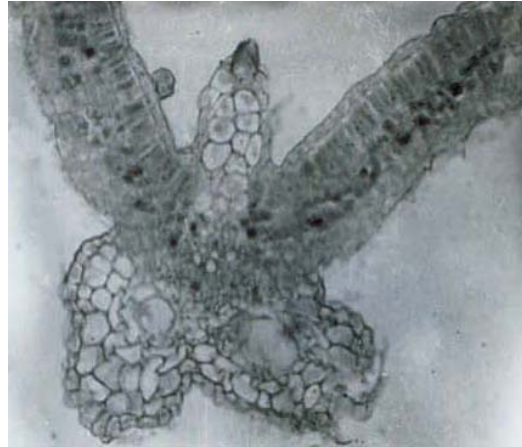
**Fig. 1: Stem, T. S. of control. X = 15.75**



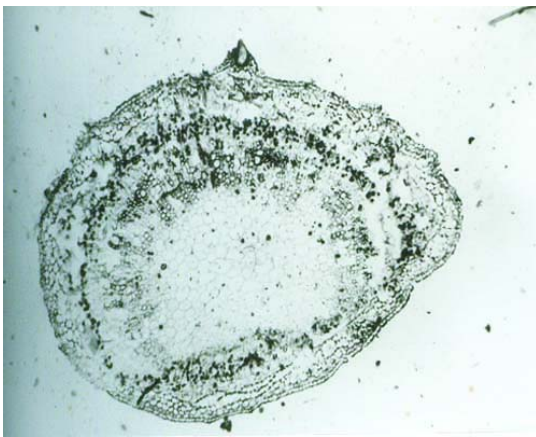
**Fig. 2: Root, TS of control. X = 31.5**



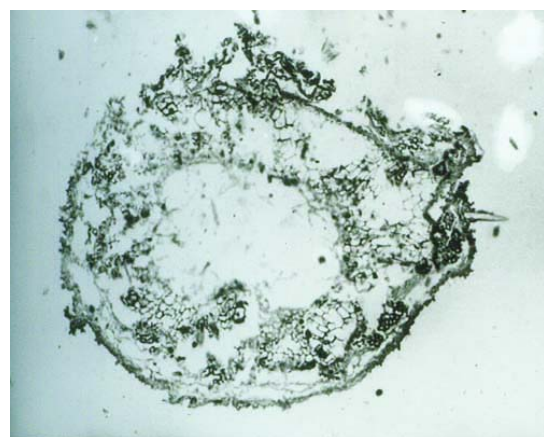
**Fig. 3: Petiole, T. S. of control X = 25.2**



**Fig. 4: Leaf, TS of control. X = 31.5**



**Fig. 5: Stem, T. S. at 100 ppm of oxyfluorfen. X = 20.16**

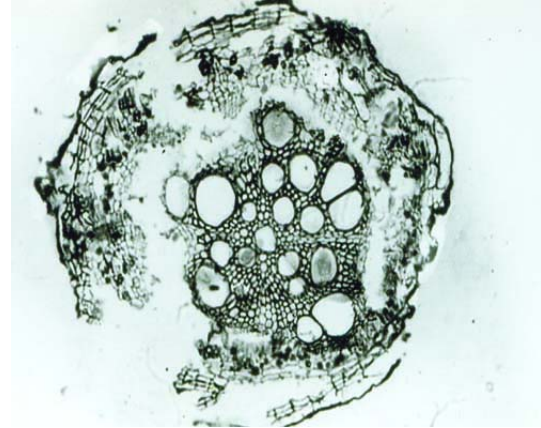


**Fig. 6: Stem, T. S. at 400 ppm of oxyfluorfen. X = 20.16**

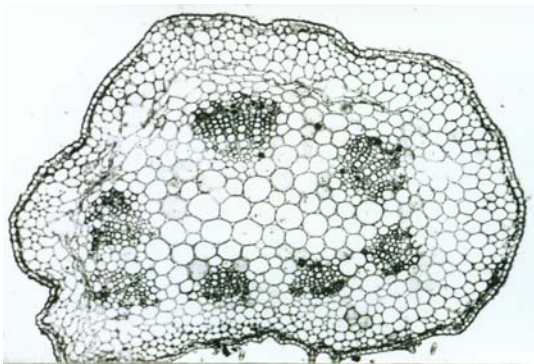




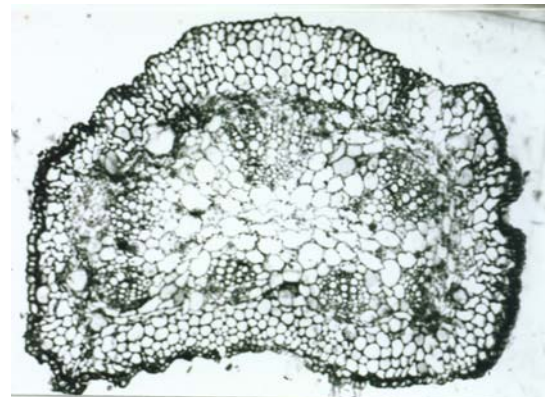
**Fig. 7: Root, T. S. at 200 ppm of oxyfluorfen. X = 31.5**



**Fig. 8: Root, T. S. at 600 ppm of oxyfluorfen. X = 25.2**



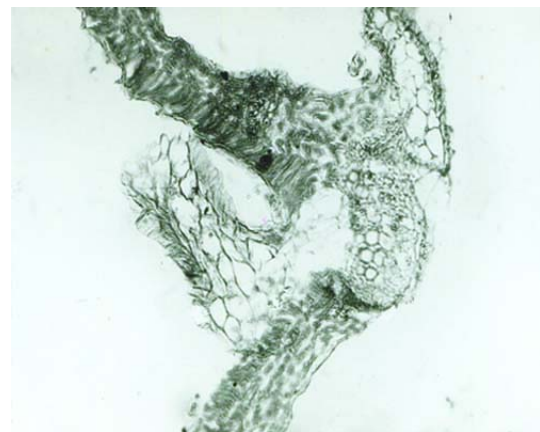
**Fig. 9: Petiole, T. S. at 100 ppm of oxyfluorfen. X = 25.2**



**Fig. 10: Petiole, T. S. at 200 ppm of oxyfluorfen. X = 25.2**



**Fig. 11: Leaf, T. S. at 200 ppm of oxyfluorfen. X = 20.79**



**Fig. 12: Leaf, T. S. at 600 ppm of oxyfluorfen. X = 20.79**

The root showed secondary growth and consisted of an outer epidermis, parenchymatous cortex followed by ring of secondary phloem and xylem. The distinct metaxylem was observed with a large vessels Fig. 2.

The outer layer of petiole was made up of epidermis. Hypodermis was below the epidermis. Vascular bundles consisted of xylem and phloem Fig. 3. The leaf was composed of three types of tissue system. The epidermal, mesophyll and Vascular. The lamina has upper and lower epidermis. The mesophyll comprises upper palisade parenchyma and lower spongy parenchyma. The midrib comprises of parenchymatous tissue embedding vascular elements Fig. 4.

### Oxyfluorfen

This herbicide induced some anatomical changes at 100 and 200 ppm. The stem showed desiccation of cells in the cortex and pith Fig. 5. Later on, cortical and pith cells at 400 and 600 ppm disorganized and lost their identity. The epidermal cells were ruptured at many places Fig. 6. The root showed desiccation and disorganization at lower concentrations i.e. 100 and 200 ppm of Oxyfluorfen Fig. 7. The cortical cells were ruptured due to the application of herbicide. The vascular bundles were also destroyed at 400 and 600 ppm Fig. 8.

In petiole, the cells of cortex found to be wrinkled and formation of proliferation masses was observed at 100 and 200-ppm concentrations Fig. 9. Owing to dividing activity of cambium, the ring of vascular bundles pushed towards the pith was observed at 400 and 600 ppm. The ruptured cortex and pith was observed at these concentrations Fig. 10.

In the leaf, the cellular organization of the lower and upper epidermis was completely lost and the mesophyll tissues lost their identity at 100 and 200 ppm Fig. 11. In the midrib, phloem and surrounded parenchymatous cells were crushed at

higher concentrations i.e. 400 and 600 ppm Fig. 12.

### DISCUSSION

Due to spray application of this herbicide the weed *Hibiscus cannabinus* Linn. Showed some anatomical changes in stem. Destruction of xylem and phloem, disorganization of cortical and pith cells were observed at all concentrations of herbicide. Ruptured epidermal cells, crushing of phloem and formations of lacunae were observed in cortex. Deshmukh (1981) on *Malvastrum coromendelianam*, *Tridax procumbens* and *Phaseolus trilobus* reported similar results due to application with Tok E-25, Gopal (1983) on *Medicago sativa* reported similar results due to application of Oxyfluorfen.

In present study, destructive effects like membrane integrity, disorganization of mesophyll tissue and damaged upper and lower epidermal cells were observed in the leaves. Leaves showed loss of cellular organization and depletion of chloroplast were observed. Fadayomi and Warven (1976) on some weeds, Deshmukh (1981) on *Malvastrum coromendelianam*, *Tridax procumbens* and *Phaseolus trilobus* and Gopal (1983) on *Medicago sativa* reported similar results due to application of oxyfluorfen. The root system get damaged and desiccated totally and cortical cells were injured and disorganized in present study. Deshmukh (1981) on *Malvastrum coromendelianam*, *Tridax procumbens* and *Phaseolus trilobus* reported the cortical cells injured and disorganized. Gopal (1983) on *Medicago sativa* reported similar results.

In the petiole, the lacunae were formed due to disorganizations of cortex. Mastunaka (1969) on some weed and Gorske and Hopen (1978) on *Portulaca oleracea* and Gopal (1983) on *Medicago sativa* reported formation of lacunae in the cortical region due to application of this herbicide.

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