

EFFECT OF 2,4-D ON SEEDLING ANATOMY OF *Cassia tora* Linn.**Minakshi Mahajan**

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(Received June 19, 2004; Accepted December 02, 2004)

ABSTRACT

A large number of seeds of *Cassia tora* were allowed to germinate at room temperature in petridishes. Seedlings of 14-16mm were treated with various concentration ranging 100 to 1200 ppm of 2,4-D for 24 hours at room temperature. Treated seedlings compared with untreated one. The length of hypocotyls and radicle was measured. It had been concluded that low concentration of 2,4-D cause abnormalities of growth in plant organs by stimulating the meristematic zones like cortex whereas the higher ones bring about cessation of growth of the root and shoot depending upon the concentration.

INTRODUCTION

As Darlington (1956) has noted man's greatest biological experiment has been invention of agriculture, a process of understanding, controlling and improving certain flowering plants of more than 3,50,000 species of plants known in the world, hardly, 3000 are of economic value to when these economic plants are grown, other vegetation also comes up which is competitive and undesirable. The plants of such vegetation are unwanted, Pernicious and harmful. They interfere with agricultural operations, increase labour, add to the cost of cultivation and reduces yield of crops. Such plants are known as weeds. Weeds have harmful effect on crops production for they reduce crop yields. Telotoxic action of some weeds is also responsible for germination and yield of crop plants also poisonous to man and animals. The detrimental effect of weeds confirm their mental effect of weeds, confirm their eradication in crop lands and other locations.

Cassia tora Linn. (Family Ceasalpiniaceae, vern. Tarota) is an annual herb of the rainy season, growing on waste lands, road sides embankments on pounds and shallow depressions about 150 to 160cm, deep. Leaves are 3-4" long, rachis grooved more or less pubescent with a conical gland between each of the two lowest pairs of leaflets, stipules ½-¾" long linear subulate, caduceus, leaflets in pairs and petiole 1/10" long, pubescent. Flowers produced in the axis of the leaves. Flowering starts in the first week of August and fruiting continuous till September and even later when moisture remains available.

The present study dealt with the herbicides on the growth and anatomical patterns as a result of 2,4-D treatment.

MATERIAL AND METHODS

A large number of seeds of *Cassia tora* were allowed to germinate at room temperature in petridishes lined with double layers of moistened paper. When seedlings attained the length of 14-16mm the seedlings of each plant were selected for treatment. Each group of 10 seedlings were treated separately with various concentrations ranging 100 to 1200 ppm of 2,4-D for 24 hours at room temperature for control one set of the seedlings was kept in distilled water. After treatment the seedlings were thoroughly washed with distilled water and allowed to grow for 72 hours in moistened filter paper in petridishes. After 72 hours the length of the hypocotyls and radicle was measured separately in each treatment were carried out.

Anatomical Studies

After 2,4-D treatment the seedlings were taken out and their transverse sections were out with the help of razor blade. This herbicides inhibition the growth of seedlings. The linear growth of the radicle as well as the hypocotyls was inhibited; growth of lateral roots of the radicle was also checked. It produced swelling of the radicle and hypocotyls. The radicle exhibited more susceptibility to the lethal effect of 2,4-D than the hypocotyls. In *Cassia tora* 100 ppm proved to be the lethal dose in the first instance, hence lower doses such as 20, 40, 60 and 80 ppm were tried for the treatment of seedlings.

RESULTS

In *Cassia tora* the growth of the radicle and hypocotyls of the seedlings was completely checked at all concentrations except 20 ppm. The hypocotyls swelled as a result of 2,4-D treatment forming a tumor towards the apex as compared to control. As compared with the open cotyledon in control, the cotyledon in treated seedling did not come out of the seed coat and remain folded. Linear growth of radicle was inhibited and lateral roots did not develop at any of the concentrations. The tip of the radicle was found to be brown in colour at 20 ppm indicating injury and this injury progressed along the length of the radicle towards its base as 40, 60 and 80 ppm. At 80 ppm the base of the hypocotyls was also found to be brown up to a certain length. However, in 100ppm further growth of seedlings stopped and proved to be lethal dose. The microscopic observations of the transverse section of the seedling of radicle and hypocotyls region indicated enlargement of cortical cells in general and some of the cortical cells were found to be broken.

In the radicle the pericyclic and the endodermal cells proliferated and gave rise to four feebly developed masses of meristematic cells. The immature cells of pericycle divided repeatedly forming a meristematic ring which pushed apart the endodermis. The cortical cells also lost their usual round shape. The diameter of the cells of cortex increased.

DISCUSSION

2,4-D was the most efficient herbicides to induce some alteration in the structure of radicle of *Cassia tora*. In the radicle the cells of the pericycle and endodermis divide repeatedly to form a group of meristematic cells. The proliferation was in the form of four feebly developed mass. Such proliferation of cells of pericycle resulting in the formation of shoulders, in the form of wings and feebly developed masses was also observed in *Cassia occidentalis*, *Lagasca molis* and *Corchorus olitorius* (Deshmukh, 1981)

The study of the effects of 2,4-D on the seedling growth. *Cassia tora* revealed that the growth of the seedling was checked. The

hypocotyls and radicle were found to be susceptible to the inhibitory action of 2,4-D. The growth of lateral roots was also observed. Inhibition of lateral roots in some dicotyledons plants was observed by Allard *et al.*, (1946) following treatment of 2,4-D at 1.0 ppm or above.

In the present study it was observed that, in the hypocotyls and the radicles of the seedlings, cortical parenchyma was partially or completely destroyed. It was also seen that the cortical cells first start enlarging and later on deteriorate. The increased diameter of the hypocotyls and radicle was due to the enlargement of the cortical cells. Similar observations were observed in *Cassia occidentalis* (Deshmukh, 1981). Weaver (1946) stated that increase in diameter of hypocotyls in the red kidney bean was mainly due to the formation of meristematic tissue in the cortex as a result of proliferation. Bond (1948) found increased in diameter of roots of *Pisum* caused by meristematic activity of pericycle accompanied by some proliferation of endodermis following hormone herbicides treatment.

So, it can be concluded that low concentration of 2,4-D cause abnormalities of growth in plant organs by stimulating the meristematic zones like cortex whereas, the higher ones bring about complete cessation of growth of the root and shoot depending upon the concentration.

Conclusion

1. 2,4-D increased meristematic activity of the endodermis and pericycle in hypocotyls and radicle forming proliferated masses of sense.
2. 2,4-D cause destruction of cortical cells rupturing of epidermis, thus exposing inner tissue to outer atmosphere.
3. 2,4-D formative effects accompanied by destructive ones on account of Excessive proliferation which upsets the normal functioning consequently leading to increase in general metabolic turn over notes which couldn't be sustained with limited available substrate. The end result was slow death of seedlings. The lethal dose was 600 ppm seems all the seedlings died at these concentrations in three days.

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