

CURVULARIA COLLAR-ROT OF CITRUS

DURING the course of study (July 1977, humid atmosphere) the seedlings of Pummelo (*Citrus grandis* Macf.) exhibited considerable damage. The symptoms noticed were dull brown to black rot near the junction of the stem and soil, which advances slightly upward and forms a brownish black ring, the bark was sometimes sloughed off. The leaves turned yellow and wilted.

The fungus was isolated in potato dextrose agar and morphology of the isolate was established as *Curvularia lunata* (Wakk.) Boed. Pathogenicity of the causal organism was confirmed by inoculating the host with mycelial bits from a week old culture. Choudhury has reported *C. lunata* as an associated fungus with sooty mould. Lele² reported *C. tuberculata* Jain, causing die-back disease of rangpur lime and other citrus sp. at seedling stage. However, Till now *C. lunata* has not been reported to cause collar rot of citrus seedlings.

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EFFECT OF GAMMA IRRADIATION OF SEEDS ON GROWTH, SEX EXPRESSION AND YIELD IN *LAGENARIA SICERARIA* STANDLE

SEEDS of *Lagenaria siceraria* Standle, variety 'Pusa Summer Prolific Long' were exposed to gamma radiation (500–2,500 rad) from ⁶⁰Co source and grown under field conditions. Irradiation of seeds upto 1,000 rad dose increased the length of vine and number of lateral branches but with higher doses these characters decreased significantly. Dosage of 1,000 rad caused the highest increase in female expression and pronounced increase in the number and weight of ripe fruits over control plants. Pollen fertility decreased with an increase in the dose.

Introduction

The ratio of staminate/pistillate flowers is an index of sex expression of a particular plant. The morphological, physiological and biochemical effects of ionising radiation have been studied in various plants by several workers¹. The effect of ionizing radiation has been

extensively reviewed by Breslavets². Saric *et al.*³ have demonstrated that the growth response to ionizing radiation depends upon dosage and dose rate of radiation, photoperiod, temperature and humidity. A good account of the effect of plant growth regulators on the physiology of sex expression in various flowering plants has been given by Lang⁴. There are a few reports regarding the effect of irradiation of dry seeds on sexual differentiation of plants⁵. The present investigation was undertaken to study the effect of gamma irradiation of dry seeds on growth, sex expression and yield of a monoecious plant *Lagenaria siceraria*.

Material and Methods

Seeds of *Lagenaria siceraria* obtained from 'National Seeds Corporation', New Delhi, used in this experiment had a water content of 19.7%. They were exposed to gamma radiation from ⁶⁰Co source at a dose rate of 2,000 rad/minute at 27–32°C dosage of 500, 1,000, 1,500, 2,000 and 2,500 rad in air. Three replicates of the experiments were carried out with essentially similar results. Pollen sterility studies were made by germinating pollen in artificial medium of 10% sucrose and 2% agar.

Results

Results are given in Table I. Plants developing from irradiated seeds showed remarkable differences in their vegetative growth, depending upon the radiation dose. Doses up to 1,000 rad increased the length of vines and the number of lateral branches but with higher doses, these characters decreased progressively. The first staminate flower developed on higher nodes and first pistillate flower on lower nodes. Irradiation also inhibited the anthesis of staminate flowers and stimulated the anthesis of pistillate flowers. Irradiation increased the number of pistillate flowers and reduced the number of staminate flowers. Pollen fertility decreased with increasing radiation dose. After 120 days of growth, fruits from each plant were collected, counted and weighed. Irradiation of seeds up to 1,000 rad increased and higher dosage decreased the number of fruits. The low radiation dose caused an increase in fruit yield while higher radiation dose caused a decrease in yield.

Discussion

Our observations clearly indicate that gamma radiation of seeds increased the formation of pistillate flowers and decreased the formation of staminate flowers in *Lagenaria siceraria*, and strongly suggest that 1,000 rad radiation dose is effective for inducing better vegetative growth, female sex expression and yield of fruits. These observations vary in many respects with those reported for *Cucumis sativus*⁶ and *Lycopersicon esculentum*. Gibberellins^{7, 8} are well known to induce male sex expression and auxins^{7, 4} the female sex expression. It is well established that auxins exert their

TABLE I

Effect of gamma irradiation of seeds on the growth, sex expression and yield in *Lagonaria siccraria*

Observations	Radiation dose (R)					
	0	500	1000	1500	2000	2500
Node having first staminate flower on main vine	16.3±0.4	18.0±1.2	22.5±0.9*	23.7±0.8*	26.1±1.4*	31.3±1.1*
Node having first pistillate flower on main vine	31.6±0.9	27.4±1.4*	25.0±1.3*	26.8±0.9*	33.4±1.3	38.6±1.1*
Days for anthesis of first staminate flower	42.8±0.6	54.7±1.5*	69.6±2.7*	63.0±1.0*	58.9±2.2*	52.4±2.0*
Days for anthesis of first pistillate flower	66.3±5.1	58.7±1.5*	39.7±1.1*	44.5±1.3*	47.0±0.9*	55.3±1.2*
No. of staminate flowers	205.0±9.6	188.6±7.2	173.1±2.3	159.4±2.6	147.5±1.3*	115.8±1.2*
No. of pistillate flowers	8.0±0.5	13.1±1.1*	18.8±1.0*	14.4±0.9*	9.3±0.6	4.2±0.5*
Ratio of staminate/pistillate flowers	25.6 : 1	14.3 : 1	9.2 : 1	11.0 : 1	15.8 : 1	27.5 : 1
Pollen fertility (%)	87	62	19	14	12	2
Length of vine (cm)	491 ±4.2	519 ±6.2	600 ±2.3	585 ±4.4*	541 ±3.6*	480 ±5.7
No. of lateral branches	9.0±1.3	13.4±1.4	20.5±1.3*	19.7±2.0*	14.1±0.2	7.9±0.1
No. of fruits/plants	7.6±0.7	13.0±0.2	17.5±0.6*	13.4±0.3*	7.0±0.4	2.6±0.1
Weight of fruits/plant (Kg.)	1.2±1.3	2.3±1.2	2.6±0.9	2.4±0.7*	2.1±0.5	1.6±0.8

* Treatment values significantly different from controls at 5% level. $n = 100$.

effect through ethylene evolution.⁹ Ethylene has also been reported to induce female sex expression in flowering plants⁸. Recently¹⁰ it was found that radiation induced ethylene production. Sidorskii¹¹ has also been reported that low level of gamma radiation alters the biochemical process in which nucleic acid contents, carbohydrate and vital activities increased, whereas our observations indicate that high level of radiation adversely affected vegetative growth and yield. It is likely that gamma radiation exerts its effect on sex expression through an increase in ethylene evolution.

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