

**SUMMARY
AND
CONCLUSIONS**

Onion is a major bulb crop grown over a large area in India. Nasik-Niphad and Jalgaon are important onion growing regions in Maharashtra. It is cultivated as 'Pol' 'Rangda' and 'Garva' crops in kharif, late kharif and rabi seasons respectively. Onion is used both in immature and mature bulb stages as a vegetable and as a spice. The bulbs of onion have medicinal properties and are used in treatment of various disorders. On the basis of bulb colour there are four main varieties of onion viz. Deep red, Red, Yellow and White. The pungency in the onion is due to the presence of a volatile oil allyl-propyldisulphide and varies from variety to variety. White skinned varieties are mild and good flavoured whereas the Red ones are more pungent.

Onion belongs to the family Liliaceae and genus *Allium* and has $2n=16$. It is popularly used for studying the cytological effects induced by various chemical treatments on cells. In the present investigation influence of Maleic hydrazide on two onion varieties has been analysed. Maleic hydrazide is a selective translocated herbicide and widely used as a growth inhibitor and weed killer.

For chemical treatment three concentrations of MH (100, 500 and 1000 ppm) and 4 durations (1, 3, 6, and 12 hours) were used and mature, healthy seeds of onion varieties N-53 and N-2-4-1 were exposed for specific exposure periods to respective concentrations of MH.

Cytological studies were carried out in the root tip cells of treated as well as untreated seeds to observe the effect of MH on somatic chromosomes. Meiotic studies in the young flower buds of N-53 and N-2-4-1 were also undertaken in the plants raised from MH-treated seeds. Along with cytological studies a few aspects of physiology were also investigated. Study of germination and growth performance and some biochemical parameters such as photosynthetic pigments, total polyphenols, proteins, RNA, ascorbic acids and mineral elements was carried out in the leaves of the two onion varieties. Biochemical analysis was performed after Ist and IIIrd month of growth in the leaves. A few organic and inorganic constituents from the bulbs of the two onion varieties were also determined. The results are summarized as follows under respective headings.

1. CYTOLOGICAL STUDIES

A. Mitotic Abnormalities

MH at 100 ppm increased the mitotic activity at all the exposure periods in both the onion varieties. The concentration of 1000 ppm MH caused a reduction in the mitotic index in both the varieties and at all the time durations.

MH induced a number of chromosomal aberrations such as stickiness, laggards, bridge formation, polyploidy

etc. in the root cells of onion varieties. The variety N-2-4-1 exhibited a higher frequency of chromosomal aberrations than the variety N-53. At higher concentrations and for the long term treatment these frequencies were significantly higher. In N-53 the herbicidal treatment of 100 ppm induced a negligible percentage of abnormal cells.

B. Meiotic Abnormalities

The chromosomal abnormalities observed in the pollen mother cells during meiosis were of the similar types as observed in the mitotic cells. The percentage of meiotic abnormalities was less as compared to the mitotic ones. Observation of ring chromosome and pentad formation was rare and occurred at higher concentration of MH. Formation of abnormal sporads was significant in N-2-4-1 than in N-53. MH increased pollen sterility in both the onion varieties at longer duration and higher concentration.

2. PHYSIOLOGICAL STUDIES

A. Seed germination

MH promoted germination at 100 ppm concentration and the response given by N-53 was better. At higher concentrations an inhibition of gemination was observed.

B. Growth Performance

Root formation was enhanced by 100 ppm MH treatment in both the varieties. Number of leaves, height

of the plant and fresh and dry weights were influenced by MH. Overall growth was found appreciably good at 100 ppm MH applied for 6 h. in both the onion varieties. MH at 500 and 1000 ppm caused a delay in flowering whereas 100 ppm treatment induced earliness in flowering in var. N-53.

3. BIOCHEMICAL ANALYSIS OF LEAVES

A. Photosynthetic pigments

Total chlorophylls and carotenoids were enhanced by 100 ppm MH. The ratio of Chl.a:Chl.b was less than control in all the MH treated plants analysed after Ist month and became about 1 in most of the treatments after IIIrd month.

B. Total polyphenols

Total polyphenols increased as concentration and the duration of MH treatment increased in both the onion varieties. The amount was higher in one month old plants than in the mature plants.

C. Carbohydrates

Total soluble sugars and starch were enhanced in both the onion varieties by 100 ppm MH treatment, the maximum being recorded for 6 hours.

D. Soluble Proteins

The protein content increased significantly over the control in both the onion varieties at 100 ppm MH

treatment for 6 hours. No variation was observed in the protein content depending upon the growth stage.

E. Ribonucleic acid content

100 ppm MH treatment was found stimulatory for RNA synthesis at all the exposure times. The level of RNA in all the treated and untreated plants declined sharply in the mature plants in both the varieties.

F. Ascorbic Acid Content

All the durations of 100 ppm MH induced an increase in vit-C content in both the onion varieties.

G. Elemental Analysis

Major elements N, P and K were positively influenced by the lower concentration of MH. An accumulation of calcium at 100 ppm MH indicated its effect on the translocation process. Magnesium content was not much affected whereas macronutrients copper and zinc exhibited an increase by the 100 ppm treatment.

4. BIOCHEMICAL ANALYSIS OF BULBS

Total sugars and ascorbic acid content in the bulbs was found increased at all the durations of 100 ppm MH. The higher concentration suppressed the synthesis of these components. The Red onion variety N-53 exhibited a higher level of anthocyanins than N-2-4-1. An enhancement in

the pigment content was observed in both the varieties at 100 ppm.

Nitrogen, phosphorus and magnesium increased in the bulbs due to 100 ppm MH treatment.

The studies indicated that seed treatment of Maleic hydrazide (100 ppm) stimulates the growth and development of the onion varieties. The response given by N-53 is excellent than N-2-4-1 which is rather sensitive to the herbicidal treatment. MH can improve the food value of bulbs in both the varieties. Thus the said treatment of MH can be used effectively in the onion varieties under investigation.