

Studies on cytological changes incited by chilli mottle virus in *C. annuum* L. on the aspect as nucleus / cytoplasmic ratio (N/C) and mitotic index (MI)

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ABSTRACT

A virus disease showing symptoms like mottling followed by leaf deformities was characterized from Chilli. The infected plants show very important symptoms in the cells which are specific host virus combination. A relationship between nucleus and its cytoplasm for its energy supply. Cytoplasm also depends upon nucleus for its replacement. The power nature of the nucleus envelope permits the ready passage of materials in either directions. The Nucleus / Cytoplasmic ratio of disease cells (0.187) was more than healthy cells (0.105). The Mitotic Index (MI) in the meristematic cells of diseased cells (5.85) was quite low in comparison to the healthy cells (20.78) of *Capsicum annuum* L.

Key words: Chilli (*Capsicum annuum* L.), Carnoy's fluid, Acetocarmine.

INTRODUCTION

Cytological study of healthy and diseased plants have very important role in the study of effect of the Chilli mottle virus on the crop. The infected plants show important symptoms in the cells which are specific host virus combination. Cytological studies mainly nucleus / cytoplasmic ratio (N/C) which is calculated by taking the help of stage micrometer and occludometer and the area of cytoplasm and nucleus of the cell are measured. Mitotic index (MI) is another aspects for the cytological study of the cells. Mitotic Index of the cell taken by a formula to study the size and number of cells, by calculating the total number of dividing cells and the total number of cells observed.

MATERIAL AND METHODS

Root tip of chilli were fixed in Carnoy's fluid (1:3), one part glacial acetic acid and three part ethyl alcohol (A.A) for 6–14 hours. After fixation this

material was washed and preserved in 70% ethyl alcohol and used in Acetocarmine root tip squash method.

In analytical method, nucleus and cytoplasmic (N/C) ratio was calculated by taking the help of micrometer and occludometer and the area of cytoplasm and nucleus were measured. N/C was calculated by the following formula.

$$N/C = \frac{\text{The sum of area occupied by nuclei}}{\text{The sum of area occupied by cytoplasm}}$$

Mitotic Index (MI) was calculated by following formula

$$MI = \frac{\text{Total No. of dividing cells}}{\text{Total No. of cells observed}} \times 100$$

Observation

Chilli mottle virus induced the cytological

variation in the *Capsicum annuum* L. The infected plants shows very important characters in the cells which were specific host virus combination. Nucleus / cytoplasmic ratio (N/C) and mitotic index (MI) were calculated by taking the help of micrometer and ocurometer. The data were presented in the table 1 and 2.

It is evident from the table (1) that the N/C ratio of healthy plants of chilli was 0.105 and diseased plants was 0.187 thus, the nucleus /

cytoplasmic ratio of diseased plants cells was increased cells of comparison to healthy plant cells of chilli.

It is evident from the table (2) that the mitotic index (MI) of healthy and diseased plant cells of chilli were 20.78 and 5.85 respectively. The mitotic division in the infected plant cells were very less, thus, the mitotic index of the diseased cells of chilli was decreased in with comparison to healthy plant cells.

Table 1 : Nucleus / Cytoplasm Ratio of the cells of *Capsicum annuum* L. induced by chilli mottle virus (Each reading is mean of two readings)

S. No.	Nucleus / Cytoplasm Ratio (N/C) of healthy plants	Nucleus / Cytoplasm Ratio (N/C) of Diseased plants
1.	0.124	0.153
2.	0.056	0.099
3.	0.098	0.145
4.	0.064	0.192
5.	0.068	0.164
6.	0.119	0.163
7.	0.100	0.213
8.	0.102	0.169
9.	0.068	0.132
10.	0.073	0.249
11.	0.099	0.205
12.	0.094	0.255
13.	0.103	0.224
14.	0.155	0.207
15.	0.144	0.193
16.	0.111	0.171
17.	0.104	0.183
18.	0.089	0.209
19.	0.134	0.217
20.	0.117	0.193
21.	0.123	0.211
22.	0.098	0.173
23.	0.143	0.234
24.	0.151	0.239
25.	0.097	0.100
Mean=	0.105	0.187

Table 2 : Mitotic Index (MI) of the cells of *Capsicum annuum* L. induced by chilli mottle virus (Each reading is mean of two readings)

S. No.	Mitotic Index of healthy plants	Mitotic Index of Diseased plants
1.	22.00	6.00
2.	13.20	5.50
3.	20.80	7.00
4.	13.00	4.00
5.	26.00	8.50
6.	13.50	3.00
7.	22.70	4.40
8.	29.00	9.00
9.	14.60	7.20
10.	24.00	6.80
11.	28.00	5.00
12.	24.50	5.20
13.	28.80	7.00
14.	9.00	6.50
15.	12.00	6.00
16.	13.50	5.80
17.	11.00	5.00
18.	45.00	5.40
19.	15.00	4.20
20.	23.00	3.80
21.	29.50	7.60
22.	24.00	9.20
23.	25.50	5.25
24.	20.00	5.20
25.	12.00	3.75
Mean =	20.78	5.85

RESULTS AND DISCUSSION

The nucleus / cytoplasmic ratio of healthy and diseased root meristem cells of chilli were formed 0.105 and 0.187 respectively. Watson (1955) while establishing a relationship between nucleus and its cytoplasm for its energy supply. On the other hand, cytoplasm is also dependent upon nucleus for its replacement, possibly through RNA which is formed in the nucleus and passed on to the cytoplasm. The power nature of the nuclear envelope permits the ready passage of materials in either direction.

Mitotic Index in the meristem cells of healthy root tip was recorded as 20.78 while the mitotic index in the meristem cells of diseased root tips was 5.85. The increase in percentage value of mitotic index of diseased cells was low in comparison to the healthy cells of chilli (*Capsicum annuum*).

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