To control the disease, 500 and 1000 ppm of terramycin (oxytetracycline hydrochloride, 20% active ingradient) was sprayed on inoculated plants in the field and glasshouse. It was observed that 1000 ppm sprays were comparatively more effective in that 40% of the treated plants recovered as against 35% recovery with 500 ppm. These results were confirmed by repeated trials. However, it was not clear whether the recovery was permanent because butterfly flower is an annual and short-duration plant.

A virus disease of *Schizanthus* sp. has been described to be caused by tobacco leaf curl virus[1] which is transmissible to tobacco and tomato. The disease is distinct from witches' broom disease now reported due to non-transmission to these hosts. The symptoms, transmission and recovery by antibiotic therapy are suggestive of the association of mycoplasma-like organisms (MLOs) with butterfly flower witche's broom disease[2-5] studies to confirm the MLOs association by electron microscopy are in progress. The pathogen of this disease has a restricted host range and does not infect hosts of commonly occurring yellow diseases in India[6-10] and thus forms a new record.

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PEROXIDASE ACTIVITY AND ITS ISOZYMES IN RELATION TO FLOWER SEX-EXPRESSION IN *RICINUS COMMUNIS* L.

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THE distribution of peroxidase activity and/or its isozymes has been shown to be highly correlative with various plant processes[1,2]. Recently the role of peroxidase activity and its isozymes have been implicated in flower sex-expression of some plants[3,4]. Nevertheless, there is no such report in monoecious systems where both staminate and pistillate flowers appear on the same inflorescence but do not have any rudimentary structures of opposite sex. The findings presented here describe the possible role of peroxidase enzyme in sex-expression of *R. communis* where rudimentary sex organs are not found.

Plants of *R. communis* were raised in earthen pots with properly-manured soil. Vegetatively growing apical meristems and male and female flower buds were used for analysis. The peroxidase enzyme was extracted with phosphate buffer (pH 7) at 0° C with 1% sodium ascorbate. The macerates were centrifuged at 16000 g for 20 min at 0° C and supernatants were collected for analysis. The enzyme activity was measured by using H_2O_2-guaiacol reaction mixture as described earlier[3].

To separate peroxidase isozymes, disc gel electrophoresis was employed using 10% polyacrylamide gels and applying 50 volt potential and 0.5 mA current per tube till the dye front reached to the bottom of the gel. The reaction mixture used for enzyme assay served as staining agent to localize the bands on the acrylamide gels.

No significant difference was observed in the specific peroxidase activity of vegetatively growing apical meristems (3.1 ± 0.6 units mg^{-1} protein) and in male flower buds (3.3 ± 0.5 units mg^{-1} protein) whereas activity on per gram fresh weight basis was high in the apical meristems (1.22 ± 0.4 units) than the male flower buds (0.95 ± 0.2 units). If the specific activity recorded in male flower buds was compared with the female flower buds (2.3 ± 0.7 units mg^{-1} protein), the former had higher activity than the later whereas no significant difference was observed in the activity taken on per gram fresh weight basis in both male and female (0.8 ± 0.2 units) flower buds. However, no activity was recorded after a few hours of extraction

Peroxidase isozymes

Apical meristem and male flower buds had 5 isozyme bands designated as B, D, E, F and G whereas female flower buds had 7 bands designated as A, B, C, D, F, G and H. Bands A and C were new in female flower buds and these were not observed in apical meristems and in male flower buds, whereas band E recorded in the male flower buds was missing in the female flower buds. The intensities of individual bands also differed in both the sexes.

It has been reported that isozyme pattern of peroxidase enzyme found in one tissue differ from the other tissue of the same species or genotype at different stages of vegetative growth[5,6] or during transition to flowering.[3,4] Sudies with peroxidase in carrot and aspen cultures[7,8] indicate that isozymes may be sensitive markers of the differentiation. In addition, some investigators have measured enzyme activity as indicators of differentiation.[9]

In *R. communis*, higher peroxidase activity is associated with the male flower buds while more isozymes with female flower buds. The appearance of the two new bands A and C in female flower buds seems tobe specific for the development of female sex organs whereas the disappearance of a band E in the later suggests its possible inhibitory role for the development of the same (*i.e.* female flower buds).

The present finding on *R. communis* is contrary to our previous finding in dioecious systems viz. in *Coccinia indica*[3], *Morus nigra*[4] and in *Carica papaya* (unpublished) wherein higher peroxidase activity was related with femaleness and more number of isozymes with maleness. Specific isozyme band(s) were found only in male flower buds. It indicates that in *R. communis*, opposite mechanism is operating in the distribution of peroxidase enzyme during sex expression.

The highest activity recorded in *R. communis* was below the lowest activity recorded in *M. nigra*, *C. papaya* and *Coccinia indica*. This is probably because of the high proteinase activity in crude extracts of *R. communis*[10]. The cease in peroxidase activity after a few hours of extraction was perhaps due to digestion of the enzyme proteins in the extract.

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MIGRATION OF NUCLEAR MATERIAL IN CALLUS CULTURES OF *TRITICUM DICOCCUM* SCHULB.

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EARLIER studies on wheat cultures[1-4] had shown that a majority of the cell population was made up of aneuploid cells and the possible mechanisms for the production of aneuploid chromosome numbers are chromosome lagging at anaphase, multipolar spindles and splitting of nucleus into two. In the present report, a phenomenon of nuclear abnormality leading to aneuploid cell formation in *Triticum dicoccum* Schulb. is recorded.

Seeds of *Triticum dicoccum* were sterilized and germinated in aseptic conditions. Root segments were cultured in Murashige and Skoog's agar medium supplemented with 0.5 mg/l 2,4-dichlorophenoxy acetic acid (2,4-D). For cytological preparations, callus pieces were stained with feulgen after proper pretreatment and fixation.

Squash preparations of root calli revealed a remarkable variation in chromosome numbers and majority of the cell population was made up of aneuploid cells. In addition to numerical and structural changes of chromosomes, the spontaneous migration of nuclear material from one cell to another was observed. As seen from figure 1 the nuclear material moves through