

As regards association between green fodder yield and other characters, six characters *viz.*, stem weight, dry fodder yield, leaf weight, crude protein yield, plant height and leaves per tiller showed significant positive correlations with green fodder yield. These six characters that were positively correlated with green fodder yield had high heritability estimates combined with high genetic advance. Selection for visible characters like plant height and leaves per tiller can easily be practised for improvement in green fodder yield.

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GROWING HYBRID TOMATO IN HILLS THROUGH TISSUE CULTURE TECHNIQUE

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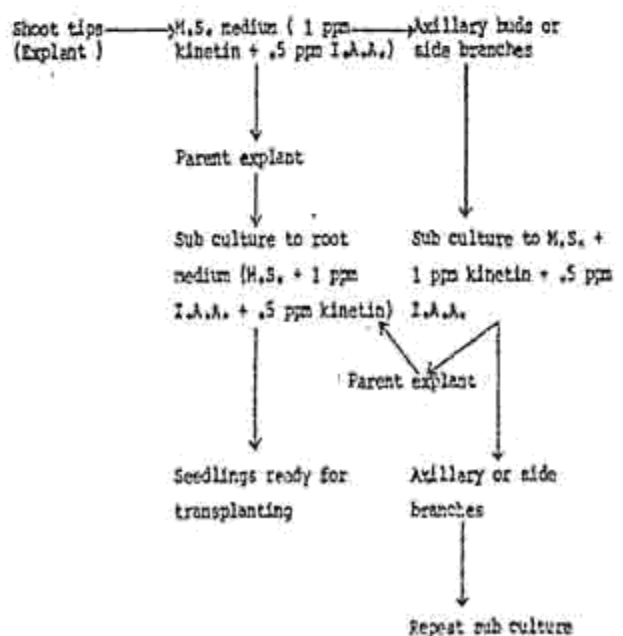
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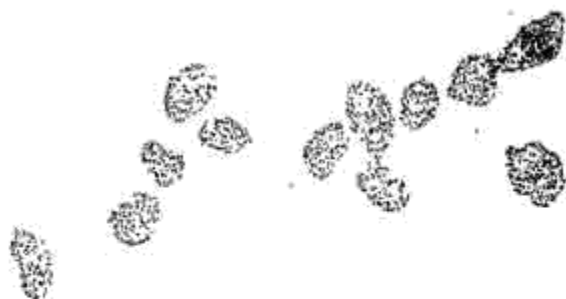
ABSTRACT

For propagation, a hybrid tomato was selected after observations on its performance in the U.P. hilly climatic conditions and it was multiplied successfully through the technique of tissue culture at the Defence Agricultural Research Laboratory, Almora.

Tomato (*Lycopersicon esculentum* Mill.) is an important fruit vegetable and its cultivation in northern Uttar Pradesh hills is restricted due to danger from frost and low temperature climatic conditions. Generally, only one crop of tomato is taken in hills annually during the summer season. But some of the hybrid tomatoes have got good resistance against frost and low temperature and growing such hybrids may enable the vegetable growers to take more than one crop annually in hilly regions of U.P. Once the plants are grown from seeds of such hybrids, there is problem of further multiplication since conventional method of multiplication through seed production is not applicable in case of hybrids. Secondly plant breeding requires the repetition of the same process by which seeds were produced earlier. This becomes a long time taking affair and also a limited number of seeds are produced by this method. For the rapid mass propagation of such hybrids tissue culture proves to be a very fruitful technique.

Moreover, it has been observed that mutation rate in case of *in-vitro* culture is very-very less i.e. 10^{-5} .





Photograph 'A' showing normal 12 bivalents at metaphase I.

MATERIALS AND METHODS

The tomato shoot tips (main shoot or axillary shoot) of 2-2.5 cm. length were taken as explant from mature plants and were culture in Murashiga and Skoog medium inside cultured tubes under aseptic conditions. This medium was supplemented with 1 to 1.25 ppm. kinetin and 0.4 to 0.5 ppm. I.A.A. (Indole Acetic Acid). This culture was given a continuous light of 4,500 to 5,000 lux for 16 hours followed by a dark period of 8 hours and the temperature of culture room was maintained at $25^{\circ}\text{C} \pm 1^{\circ}\text{C}$ constantly. After a period of 12-15 days the axillary buds and side branches start growing from the explant which are ready for sub culturing within a period of two weeks after bud initiation. The axillary or side buds are cut off from the parental explant and are sub cultured further in the same medium. The parental explant is sub cultured in the M.S. medium supplemented with kinetin 0.5 ppm and I.A.A. 1.5 ppm. These two types of sub

cultures are repeated time to time until the desired number of plant seedlings are obtained. This total process can be represented diagrammatically.

RESULTS AND DISCUSSION

After culturing the shoot tips in M.S. medium supplemented with 1 ppm kinetin and 0.5 ppm I.A.A., 2 to 3 axillary or side branches were obtained from a single shoot tip at each step of culture and sub culture. But the final sub-culture to M.S. medium supplemented with 1 ppm. I.A.A. + 0.5 ppm kinetin resulted good root and shoot growth both. A complete seedling ready for transplanting is obtained within a period of 15-17 days after sub culture to root medium. Thus a number of tomato seedlings are obtained in due course of time after a continuous repetition of this process.

It has also been observed that the desired characters of this heterozygous tomato were retained intact with these newly formed seedlings through the technique of tissue culture. Cytological studies revealed normal chromosomal number and behaviour which confirms the chromosomal homogeneity of hybrid plants raised in tissue culture (Photograph 'A').

The exogenous application of kinetin in higher concentration to shoot tips may overcome the effect of apical dominance and stimulates the axillary or lateral buds to grow in presence of terminal bud. Secondly, the high concentration of I.A.A. induces more rooting than the shoot when sub-cultured to the root medium. We may also conclude that the number of seedlings obtained from this technique are dependent upon the number of explants cultured as well as number of axillary or side branches obtained at each stage. Finally, it has been observed that the rate of multiplication in aforesaid hybrid tomato by this technique was found approximately three fold per 27 days.