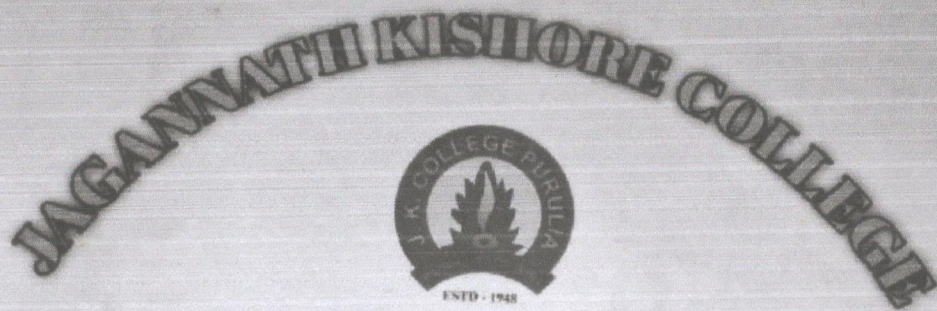




BOTANY DEPARTMENT

5TH SEMESTER

YEAR : 2023

Project Name: Comparative study of change in leaf morphology of wild type & hybrid tomato plants under drought stress

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* Comparative study of change in leaf morphology of wild type drought resistant hybrid tomato plants under drought stress. ①

❑ Introduction:

● Plant stress: Stress in plants refers to external conditions that adversely affect growth, development or productivity of plants.

Plant stress can be divided into two primary categories namely Abiotic stress and biotic stress.

▶ Biotic stress in plants is caused by living organisms, specially viruses, bacteria, fungi, nematodes, insects, arachnids and weeds.

▶ Abiotic stress such as drought (water stress) excessive watering (water logging); extreme temperatures, salinity and mineral toxicity negatively impact growth, development, yield and seed quality of crop and other plants.

● Drought stress: Drought stress can have significant economic impacts on agriculture, leading to crop yield reductions.

→ Typical drought stress symptoms in plant include leaf rolling, stunting plants, yellowing leaves, leaf scorching, permanent wilting.

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However, in stress-tolerant plant-species, exposure to a particular stress leads to acclimation to that specific stress in a time-dependent manner.

② Drought Stress in tomato plant.

In tomato plant, the effects of drought stress lead to various changes in morphological and physiological characters, i.e., the decreases in the plant height, dry weight, shoot, root ratio, yield, relative water content and the chlorophyll content.

⇒ Common symptoms include wilting, curling and yellowing of leaves. Additionally, the edges of leaves may become dry and crispy. In severe cases, drought stress can lead to leaf drop, affecting the overall health and productivity of the tomato plant.

② Materials: (i) Seeds of tomato plant - wild cherry tomato
Seeds (wild type) Green world tomato
Ashiyama 4 hybrid (drought resistant)
Two containers, high quality potting soil
manures.

(ii) Ethanol (95%), distilled water, test tubes, beakers, tissue papers.

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③
● Method:

- ① → Two containers were filled with well draining potting soil.
 - Two types of seeds were planted in two different containers separately.
 - The soil was watered thoroughly after planting.
 - After about 3 weeks when the plants attain 4-5 leaves stage, drought stress was applied in both type of plants by withholding water supply.
- ② → After stress treatment (5 days), leaves were harvested
 - Harvested leaves were processed for chlorophyll extraction.
 - Briefly, leaves were washed and dried post harvest. The leaves of both wild type & hybrid plants were crushed in 95% ethanol. The extracts were left overnight and the upper part of both the extracted solvent were poured in separate tubes and observed for any difference.

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④ Observation:

• Before Stress:

initially, until 4-5 leaved stage. when no stress was applied both type of the plants were growing normally.

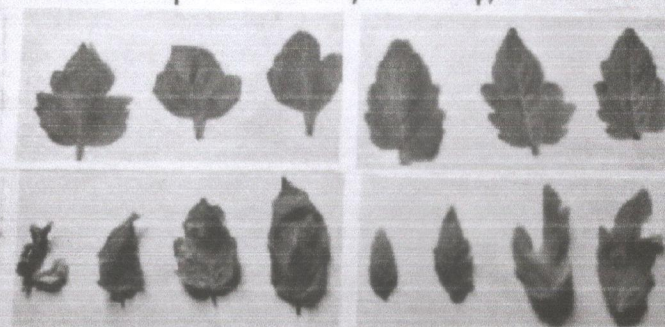


a.

b.

Fig. 4 weeks old tomato plants, before stress: a. wild type and b. hybrid plants

• After Stress: After application of stress, the wild type plants were found to be more wilted and loss of chlorophyll was also observed in wild type plants compared to hybrid drought resistant plants. This was corroborated with chlorophyll extraction data. i.e., wild type plants were found to have lower chlorophyll content post stress application compared to hybrid type.



a.

b.

Fig. Harvested leaves post drought stress in a. wild type and b. hybrid plants

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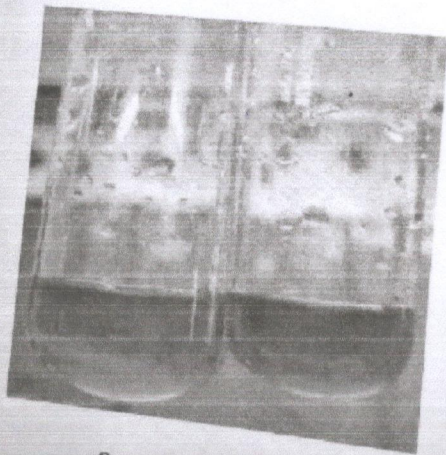


a.



b.

Fig. 4 weeks old tomato plants, 5 days post drought stress: a. wild type and b. hybrid plants



a.

b.

Fig: Chlorophyll extracted from a. wild type plants, b. hybrid plants

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Conclusion:

It has been known that the hybrid plants are vigorous compared to their wild counterpart. In the present study it is found that the drought hybrid form plants are able to resist the drought stress and their growth is better than the wild type plant.

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