PIG-3432 : PHYSIOLOGICAL CHARACTERIZATION OF SELECTED MULBERRY GENETIC RESOURCES WITH REFERENCE TO WATER AND NITROGEN USE EFFICIENCY.

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Introduction:

The major challenge for sustainable sericulture will be to increase crop production with limited water and other inputs particularly Nitrogen. For developing mulberry varieties with high input use efficiency, it is highly pertinent to identify mulberry genotypes with high water and nitrogen use efficiency and specific traits associated with these processes are prerequisite.

Objectives:

- To identify mulberry accessions with high water and nitrogen use efficiency
- To identify characters associated with NUE and WUE and to estimate the genetic variability for associated characters

Outcome

- High variability was observed for leaf senescence, proline content, early vigour, leaf yield/plant, growth during stress period, reducing sugars, drought resistance index under water-limited conditions.
- Under low Nitrogen conditions high CV was recorded for total N uptake, leaf yield/plant (Nitrogen use efficiency), chlorophyll content and plant height whereas medium variability was observed for *GST* activity.
- 17 accessions found to be superior based on multiple traits under water limited conditions.

Promising accessions based on nitrogen use efficiency (NUE)		
Efficient and non responders (low N input)	**Inefficient Responders (high N input conditions)**	**Efficient and Responders (low and high N input)**
MI-0685 and MI-0683	**MI-0139, MI-0178, MI-0573, MI-0416, MI-0193, MI-0533**	**MI-0256, MI-0332, MI-0768, MI-0762, MI-0477, MI-0622, MI-0226, MI-0657, MI-0763, MI-0346, MI-0025, MI-0699, MI-0314, MI-0214, MI-0670, MI-0827, MI-0161**

- Leaf yield under water stress and drought resistance index had significant positive association with early vigour, growth during stress, chlorophyll content, specific leaf area, reducing sugars, proline and root characters.
- Leaf yield under low N is positively associated with N uptake, plant height, %N in leaf, glutamine synthetase activity and total chlorophyll whereas negatively correlated with harvest index. The accessions with high harvest index could not tolerate low N stress under repeated pruning.

Association of different morph-physiological parameters with leaf yield and drought resistance index		
Parameter	**leaf yield under water stress**	**drought resistance index**
Days to sprouting	-0.664**	-0.535**
Early vigour	0.789**	0.512**
Relative water content	0.144	0.163
Growth during stress	0.642**	0.510**
Chlorophyll content	0.307**	0.316**
Specific leaf area	0.184*	0.216*
Single leaf weight	0.287**	0.097
Membrane stability	0.038	0.094
Leaf senescence	-0.139	-0.280**
Leaf moisture	0.122	0.081
Reducing sugars	0.364**	0.187*
Proline content	0.292**	0.060
No.of roots/sapling	0.471**	0.327**
Root weight/sapling	0.431**	0.318**
Root length	0.427**	0.386**
Drought resistance I	0.748**	

Association of morpho-physiological parameters with leaf yield and tolerance limit to Nitrogen stress		
Parameter	**leaf yield under low N**	**Tolerance limit to N**
Plant height	0.764**	0.481**
%N in leaf	0.230*	0.183*
Total chlorophyll	0.181*	0.125
GA activity	0.200*	0.252**
Harvest index	-0.319**	-0.265**
N uptake	0.937**	0.511**

S.No	Cross	S.No	Cross
1	MI-0437 × ME-0125	8	MI-0827 × MI-0012
2	MI-0437 × MI-0256	9	MI-0685 × MI-0308
3	MI-0214 × MI-0670	10	MI-0685 × MI-0314
4	MI-0762 × ME-0016	11	ME-0065 × MI-0670
5	MI-0762 × ME-0065	12	MI-0835 × MI-0670
6	ME-0244× MI-0768	13	MI-0828 × MI-0161
7	MI-0763 × MI-0012	14	ME-0244× ME-0065

Recommendations/ Utilization:

- ✓ Exotic mulberry accns. and accessions with very high harvest index cannot tolerate low N condition in repeated pruning.
- ✓ Mulberry accessions with high shoot elongation and leaf area expansion showed high response to N input.
- ✓ Selected accessions from the identified germplasm were utilized under the project on development of drought tolerant genotypes for rain fed sericulture under CSR&TI Berhampore and six genotypes combined with high yield have been identified.
- ✓ The crosses are expected to give better progeny with drought tolerance characters and can effectively utilize water and nitrogen.