

**Morphological and Molecular Analysis of Intervarietal
Variability in Water Chestnut (*Trapa natans* var. *bispinosa* Roxb.)
in Central Uttar Pradesh**

ABSTRACT

SUBMITTED TO THE
BABASAHEB BHIMRAO AMBEDKAR UNIVERSITY, LUCKNOW

**BABASAHEB
BHIMRAO
AMBEDKAR
UNIVERSITY**



• LUCKNOW •
प्रज्ञा शील करुणा
ESTABLISHED 1996

FOR THE AWARD OF THE DEGREE OF

**DOCTOR OF PHILOSOPHY
IN
HORTICULTURE**

Supervisor
Prof. Deepa H. Dwivedi

Submitted by
Munni Gond
Enrolment No. 273/13

**DEPARTMENT OF APPLIED PLANT SCIENCE (HORTICULTURE)
SCHOOL FOR BIO-SCIENCES AND BIOTECHNOLOGY
BABASAHEB BHIMRAO AMBEDKAR UNIVERSITY
(A CENTRAL UNIVERSITY)
VIDYA VIHAR, RAE BARELI ROAD
LUCKNOW-226025 (U.P.) INDIA**

2020

Abstract

The study was conducted at Babasaheb Bhimrao Ambedkar University, Lucknow, Uttar Pradesh, India and entitled, “Morphological and Molecular Analysis of Intervarietal Variability in Water Chestnut (*Trapa natans* var. *bispinosa* Roxb.) in Central Uttar Pradesh” during 2016-2018. Water chestnut (*Trapa natans* var. *bispinosa*) is an important crop with immense nutritional value for its edible fruit. It has the capacity to grow in aquatic waterlogged ecosystems and is thus, a potential alternative horticultural crop. Till date there are no standard cultivars of the crop and thus, in the present study native germplasm of water chestnut in the regions around district Lucknow has been surveyed, collected and evaluated for its variability. The investigation was divided into two parts. In Part I, a survey and collection was done in five blocks of Lucknow viz., Mohanlalganj, Gosainganj, Sarojini nagar, Bakshi Ka Talab and Malihabad. Plants of the promising cultivars were collected from each pond based on the feedback of farmers and were established and conserved in ponds at Vocational Floriculture Farm, Department of Applied Plant Science (Horticulture), Babasaheb Bhimrao Ambedkar University, Lucknow, Uttar Pradesh, India for evaluation of superior germplasm. In Part II of the study, inter varietal variability in the germplasm of water chestnut in the district Lucknow was evaluated through botanical descriptors developed, anatomical and morphological studies supplemented with fruit physico-chemical evaluation and molecular studies.

Statistically significant variation has been recorded in the morphological parameters of the plant as well as fruit. Botanical descriptors show variations in leaf shape, fruit and kernel parameters. However, biometrical values for these characters show a higher PCV as compared to GCV values indicating an environmental effect on expression of the characters. These have been further elucidated with the help of the significant variability in the anatomical and stomatal characters of the samples studied which show higher GCV values and higher heritability and genetic advance.

Intervarietal variability thus established through different techniques was further substantiated through molecular studies. SDS-PAGE of the various samples under study has elucidated the variations in the banding patterns obtained for the different samples indicating expression of different proteins in different morphotypes which is deduced to be indicative of existing variability. This however, needs deeper and

more focussed analysis. Cluster analysis of the various parameters has shown that the sample population forms two main clusters. One cluster further divided into three sub-clusters (IA, IB and IC). In view of the importance of the crop for sustainable horticulture under the changing climate patterns the study gains significance and needs to be further extended to cover other parameters of study.