INTERNATIONAL JOURNAL OF PLANT PROTECTION
VOLUME 10 | ISSUE 2 | OCTOBER, 2017 | 465-474

● e ISSN-0976-6855 | Visit us : *www.researchjournal.co.in*

IJPP

RESEARCH PAPER

DOI : 10.15740/HAS/IJPP/10.2/465-474

Evaluation of guar (*Cyamopsis tetragonoloba* L.) genotypes for seasonal adaptability in semi-arid tropics

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ARITCLE INFO

Received : 11.07.2017
Accepted : 30.09.2017

KEY WORDS :
Guar (*Cyamopsis tetragonoloba* L.), Seasonal adaptability, *Kharif, Rabi,* Summer seasons, Guar gum, Gum industry

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ABSTRACT :

This study evaluated the seasonal adaptability of 22 guar (Cyamopsis tetragonoloba L.) genotypes across three cropping seasons (Summer, *Kharif* and *Rabi*) in the semi-arid tropics of Andhra Pradesh, India. The objective was to assess growth and yield performance, and to identify stable genotypes for varietal recommendation. Field experiments were conducted using a Randomized Block Design with three replications. Results revealed significant seasonal and genotypic variations in key traits such as plant height, days to flowering, branching, pod formation, seed yield, and harvest index. The *Kharif* season emerged as the most favorable, with the highest seed yield (1293 kg ha^{-1}) due to optimal moisture and moderate temperatures, while summer exhibited constraints from heat stress. Genotypes GAUG 9703, RGC 1066 and RGM 125 demonstrated consistent performance across all seasons, highlighting their broad adaptability. Significant genotype × season interactions underscored the importance of environment-specific evaluations for breeding and cultivation. The findings advocate for season-specific genotype deployment to enhance guar productivity in semi-arid regions, with implications for both food security and industrial gum demand.

How to view point the article : Naik, Chavan Syamraj (2017). Evaluation of guar (*Cyamopsis tetragonoloba* L.) genotypes for seasonal adaptability in semi-arid tropics. *Internat. J. Plant Protec.*, **10**(2) : 465-474, **DOI : 10.15740/HAS/IJPP/10.2/465-474**.

INTRODUCTION

Guar (*Cyamopsis tetragonoloba* L.), commonly known as cluster bean, is a drought-hardy annual legume primarily cultivated in arid and semi-arid regions for multiple purposes, including grain, fodder, vegetable, green manure, and industrial gum. India is the global leader in guar cultivation, contributing approximately 80% of the world's total production, covering an area of around 33.47 lakh hectares with a productivity of 350 kg ha^{-1}. Rajasthan alone accounts for 70–80% of the national guar acreage, followed by states such as Gujarat, Haryana, Punjab, and Andhra Pradesh (Chamola and Hasija, 1984 and Indiastat, 2006–07). The increasing global demand for guar gum, a galactomannan polysaccharide derived from the seed endosperm, has transformed Guar into an industrially significant crop. Guar gum finds extensive applications across diverse sectors, including food processing, cosmetics, paper, textiles, oil drilling, pharmaceuticals, and explosives, due