

Effect of Moisture Stress on Qualitative Characters in Cluster Bean Genotypes*

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ABSTRACT

Four Cluster bean genotypes viz., Pusa Naubahar, Pusa Sadabahar, Super 501 and Navchetana were evaluated for their response to qualitative characters under induced soil moisture stress at three different stages of crop growth viz., vegetative (30 DAS), flowering (45 DAS) and pod development stage (70 DAS). Results revealed that stress at pod development stage reduced the pod protein content (3.61%) whereas crude fibre content (2.73%) was increased in all the cultivars. Among the cultivars Super 501 recorded higher pod protein (3.93%) and lower crude fibre content (2.24%) under stress.

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INTRODUCTION

Cluster bean (*Cyamopsis tetragonoloba* L.) commonly known as 'guar' is one of the most important drought resistant *kharif* legume capable of growing under poor fertility and scanty rainfall conditions. Due to its multiple importance as fodder, vegetable and industrial seed gum it has become popular and research work has gained momentum from last few years. But still very little is known about the most important parameters like quality, particularly under drought. Hence this work was undertaken to study the changes in quality characters like protein content and crude fibre content of the pods in relation to moisture stress under different stages of crop growth.

MATERIALS AND METHODS

A field trial was conducted at the Horticultural garden, S. V. Agricultural College, Tirupati to study the effect of moisture stress at different stages of crop growth in certain Cluster bean cultivars

during the summer season 1998. The trial was carried out in a Randomised complete block design with four stress treatments viz., stress at vegetative stage (30 DAS), stress at flowering stage (45 DAS), stress at pod development stage (70 DAS) and stress free control. There were four cultivars viz., Pusa Naubahar, Pusa Sadabahar, Super 501 and Navchetana and three replications. Water stress was imposed in respective treatments by withholding irrigations till the CPE readings reached evaporation of 70 mm and then irrigations were resumed till harvest. The protein content in pods (%) was calculated by multiplying N% of pods with a constant 6.25. The per cent N in pods was estimated following the micro kjeldahl's method. Crude fibre content in pods (%) was estimated as per the procedure described by Ranganna (1979).

RESULTS AND DISCUSSION

Protein content in pod (%) : The study shows that moisture stress at different stages as well as cultivars exhibited a

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significant variation in pod protein content (%) (Table-1). Among the crop growth stages the stress at pod development stage recorded significantly the lowest protein content in

Pods (3.61%) followed by flowering and vegetative stages, while, the stress free control recorded higher pod protein content (3.90%). Failure of amino acid metabolism

TABLE 1

Effect of moisture stress at different phenological stages of crop growth in cluster bean cultivars on protein content in pod (%).

Cultivars Stress treatments	Pusa Naubahar	Pusa Sadabahar	Super 501	Navchetana	Mean
Control	3.86	3.90	4.13	3.73	3.90
Stress at vegetative stage (30 DAS)	3.86	3.83	3.96	3.66	3.81
Stress at flowering stage (45 DAS)	3.76	3.82	3.93	3.72	3.80
Stress at pod development stage (70 DAS)	3.56	3.63	3.70	3.56	3.61
Mean	3.75	3.79	3.93	3.66	-
		F-test	S.E.m.±	CD 5%	
Varieties	:	S	0.03	0.10	
Stages	:	S	0.03	0.10	
Interaction	:	NS	0.07	-	

causing breakdown of protein content in pods under stress at pod development stage might be the reason for the decline in pod protein content. Similar reports were made by Lenka and Gautam (1971) in pea and Anuradha (1994) in soybean.

Among the cultivars Super 501 was found to be superior which recorded significantly the highest pod protein content (3.93%) followed by Pusa Sadabahar

(3.79%) and Pusa Naubahar (3.75%) while the cultivar Navchetana recorded the lowest pod protein content (3.66%). The superiority of the cultivar Super 501 attributed to its ability to withstand moisture stress and still yield higher pod protein content.

Crude fibre content in pod (%) : Moisture stress at different stages of crop growth as well as cultivars and their interaction was significant regarding crude

TABLE 2

Effect of moisture stress at different phenological stages of crop growth in cluster bean cultivars on crude fibre content (%).

Cultivars Stress treatments	Pusa Naubahar	Pusa Sadabahar	Super 501	Navchetana	Mean
Control	2.30	2.13	2.03	2.05	2.12
Stress at vegetative stage (30 DAS)	2.36	2.20	2.10	2.15	2.20
Stress at flowering stage (45 DAS)	2.43	2.36	2.16	2.38	2.33
Stress at pod development stage (70 DAS)	2.63	2.76	2.70	2.83	2.73
Mean	2.43	2.36	2.24	2.35	-

		F-test	S.Em.±	CD 5%
Varieties	:	S	0.02	0.06
Stages	:	S	0.02	0.06
Interaction	:	S	0.04	0.12

fibre content in pods (Table-2). Moisture stress during pod development stage recorded significantly the highest crude fibre content (2.73%) and it was declined progressively with stress in the earlier stages of crop growth. Stress at vegetative stage had little effect on crude fibre content (2.20%) and it was on par with control (2.12%), indicating moisture stress at pod development stage is detrimental to the quality of the pods as it increased the crude fibre content. Among the cultivars Super 501 recorded significantly lower crude fibre content (2.24%) under moisture stress conditions, indicating its genetic ability to withstand moisture stress and results a superior quality produce. These results are in accordance with findings of Maurer *et al.* (1968) in snapbeans. The cultivar Pusa Naubahar recorded significantly higher crude fibre content (2.43%) followed by Pusa Sadabahar (2.36%) and Navchetana (2.35%). A significant interaction was recorded between stress at different stages and cultivars regarding crude fibre content in pod. Cultivar Navchetana recorded significantly higher crude fibre content (2.83%) during stress at pod development stage, while it was the least with Super 501 (2.03%) under non stress conditions.

It can be concluded that stress at pod development stage was found to be more detrimental to the quality of pods and the cultivar Super 501 was considered to be the best to produce quality crop even under stress at pod development stage.

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