RESPONSE OF CLUSTER BEAN [CYAMOPsis TETRAGONOLOBA (L.) TAUB.]
VARITIES TO DIFFERENT TIMES OF SOWING – A REVIEW

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ABSTRACT
Cluster bean, popularly known as guar is a drought tolerant annual crop grown mostly in north-western states viz., Rajasthan, Gujarat, Haryana, Punjab and different parts of Uttar Pradesh. Among different agronomic practices, selection of suitable variety and optimum time of sowing are the important non-monetary inputs for obtaining higher yield potential. A good variety often fails to express its potential even under good management conditions, unless it is sown at a right time. Summarizing the review undertaken, it could be concluded that sowing of guar during first fortnight of July was found to be better than the other times of sowing. The variety Durgapur Safed significantly out-yielded the other varieties in respect of seed, protein and gum production.

Key words : Cluster bean, Time of sowing, Varieties.

Cluster bean is a drought-tolerant crop, widely grown in arid and semi-arid regions receiving an annual rainfall 200-600 mm. It is now one of the most important crops for industries due to its gum content (35-40 %). Gum is extensively used as sizing agent in paper and textile industries, as an effective flocculent and filterant in mining and metallurgical processes, as water blocking agents in explosives and as a thickener etc., Protein rich guar meal (42 % protein), is a by product used as an animal feed concentrate. Guar, being a leguminous crop, also adds fertility to the soil by fixing atmospheric nitrogen. Despite of its importance, very little attention has been paid to study the effect of dates of sowing and varieties on yield and quality of cluster bean.

EFFECT OF TIME OF SOWING ON GROWTH PARAMETERS

Lakshmi Kalyani (2006) conducted an experiment on guar during kharif season on sandy loam soil and found that crop sown during second fortnight of July resulted in taller plants, while the highest leaf area index (LAI) and dry matter production with second fortnight of August.

Taneja et al. (1995) stated that crop sown on June 20 produced significantly taller plants, larger leaf area index (LAI) and higher dry matter production as compared to July 10 and July 30 sowings. From field trials conducted at Bhatinda, Tiwana and Tiwana (1992) reported that crop sown on June 30 recorded significantly higher plant height followed by June 15 and June 17 sowings. Experiments conducted at Hisar, Haryana indicated that early sowing of guar on June 1st resulted in maximum plant height which was superior to delayed sowings, during both the years of study (Kanwar Singh et al., 1979).

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EFFECT OF TIME OF SOWING ON YIELD ATTRIBUTES

Among different dates of sowing, first fortnight of July resulted in maximum number of clusters plant\(^{-1}\), number of pods plant\(^{-1}\), pod length and test weight than second fortnight of July, first and second fortnight of August in Tirupati (Lakshmi Kalyani, 2006). Taneja et al. (1995) revealed that sowing on July 10 produced significantly higher number of clusters plant\(^{-1}\), number of pods plant\(^{-1}\), number of seeds pod\(^{-1}\) than with either early or late sowings.

Bhadoria and Chauhan (1994) stated that sowing of cluster bean on July 10 has resulted in higher thousand seed weight compared to July 25 and August 8 sowings.

Taneja et al. (1984) reported that sowing of guar on July 5 has resulted in higher number of clusters plant\(^{-1}\) and number of pods plant\(^{-1}\), but did not notice any significant difference in the number of seeds pod\(^{-1}\) compared to June 20, July 20 and August 5. Kanwar Singh et al. (1979) recorded the highest number of pods plant\(^{-1}\), number of seeds pod\(^{-1}\) and test weight with the crop sown on July 15, which was significantly higher than with June 1, 15, 30 and July 30 sowings.

According to Bains and Dhillon (1977), the number of pods plant\(^{-1}\) and number of seeds pod\(^{-1}\) decreased significantly with delay in sowings from July 6 to August 3.

EFFECT OF TIME OF SOWING ON YIELD

According to Lakshmi Kalyani (2006) significantly higher guar seed and stalk yield obtained with first fortnight of July sown crop as compared to delayed sowings.

Higher seed and stalk yield was recorded with June 20 sown crop as compared to delayed sowings on July 10 and July 30 (Taneja et al., 1995). Bhadoria and Chauhan (1994) pointed out that sowing during first fortnight of July produced significantly higher seed yield than second fortnight of July and first fortnight of August sowings.

Sharma et al. (1993) revealed that sowing of cluster bean performed equally well under both dates of sowing i.e., first fortnight and second fortnight of August, under rainfed conditions. The seed and stover yield of guar did not differ significantly with all the three dates of sowing viz., June 15, 30 and July 17, at Regional Research Station, Bhatinda, Punjab (Tiwana and Tiwana, 1992).

Experiment conducted at Hisar, concluded that July 10 sowing produced significantly higher yield than with June 25, July 25 and August 10 sowings (Veena Jain et al., 1987).

Yield and yield components decreased with delay in sowings from July 15 onwards (Ahmad et al., 1984). The cluster bean sown on July 5 recorded higher grain yield than with earlier or late sowings (Sharma et al., 1984). Taneja et al. (1984) revealed that sowing of cluster bean on July 5 produced significantly higher grain yield than early sowing on June 20 or late sowing on July 20 and August 5.

According to Kanwar Singh et al. (1979), significantly higher guar seed yield was obtained with July 15 sown crop as compared to early sowings on June 1, 15, 30 and delayed sowing on July 30. Sowing of cluster bean on July 6 produced significantly higher grain yield than the crop sown on July 20 and August 3 (Bains and Dhillon, 1977).

EFFECT OF TIME OF SOWING ON QUALITY PARAMETERS

1. Crude gum content and gum yield of seed

Among different dates of sowing, first fortnight of July resulted in significantly higher crude gum content and crude gum yield than with delayed sowings (Lakshmi Kalyani, 2006). Crop sown on July 10 recorded higher gum content than with June 25, July 25 and August 10 sown crop, at Hisar, Haryana (Veena Jain et al., 1987).

Crude gum content and crude gum yield did not exhibit significant differences among the three dates of sowing (July 5, 20 and August 5) and all
these were significantly superior over the first date (June 20) (Sharma et al., 1984). Bains and Dhillon (1977) did not notice any significant difference in the gum content of the seeds with varied time of sowing.

2. Crude protein content and protein yield of seed

Experiment conducted at Tirupati, Andhra Pradesh revealed that crude protein content and crude protein yield was more with first fortnight of July sowing than second fortnight of July, first and second fortnight of August. (Lakshmi Kalyani, 2006).

Maximum protein content was recorded when guar sown on June 25 and August 10 as compared to July 10 and 25 sowings (Veena Jain et al., 1987). Sharma et al. (1984) found that crude protein percentage along with protein yield were significantly higher with July 5 planting than all other dates of sowing (June 20, July 20 and August 5). Delay in sowing time from July 20 to August 3 resulted in slightly increase in the crude protein content as compared with early sowing of July 6 (Bains and Dhillon, 1977).

PERFORMANCE OF GUA R CULTIVARS ON GROWTH PARAMETERS

Among different guar cultivars tried, RGC-986 recorded higher plant height and leaf area index than RGC-1003, RGC-1017 nd RGC-936 (Choudhary et al., 2006).

The cultivar GUAG 9703 produced the tallest plants with higher leaf area index and dry matter production as compared to RGC 1003, HG 563 and RGM 112 during kharif season (Lakshmi Kalyani, 2006). Shivran et al. (1996) observed that among the varieties, RGS 197 recorded significantly taller plants and maximum dry matter compared with Durgajai and RGC 936. Yadava et al. (1991) reported that HG 75 and HG 182 varieties produced significantly higher dry matter than FS 277. Among the different guar cultivars tried, IGFRI-S 212 recorded higher dry matter yield than HFG 199, HG 75, FS 277 and HG 182 (Tripathi and Gill, 1988).

Gill and Tripathi (1982) did not observe any difference in dry matter yield between FS 277 and Guar No.2. Menon et al. (1982) reported that leaf area index (LAI) of nine cultivars of guar ranged from 0.144 to 4.370. Taneja et al. (1982) reported that plant height of FS 277 was higher than Durgapur Safed. Field trials conducted at Jobner, Rajasthan revealed that guar cultivar Durgapur Safed was found to be superior in dry matter accumulation than FS 277 (Ashok Chauhan and Bajpai, 1979).

PERFORMANCE OF GUA R CULTIVARS ON YIELD ATTRIBUTES

Choudhary et al. (2006) observed that RGC -986 had more number of yield attributing characters as compared to RGC 1003, RGC-1007 and RGC-936.

Lakshmi Kalyani (2006) stated that RGM 112 and HG 563 were on par with each other and produced more number of yield attributing characters than RGC 1003 and GUAG 9703. Maximum number of pods plant\(^{-1}\) was observed in cultivar HGS 870 than RGM 115 and HGS 365 varieties, but did not differ significantly with regard to test weight at Dryland Agricultural Project (ICAR), Bichpuri, Agra (Chauhan et al., 2004). Shivran et al. (1996) reported that guar cultivar RGC 197 proved to be superior in producing more number of pods plant\(^{-1}\), number of seeds pod\(^{-1}\) and thousand seed weight than Durgajai and RGC 936.

Experiment conducted at IARI, New Delhi by Balyan and Jagdish Seth (1989) revealed that HG 258 recorded more number of clusters plant\(^{-1}\), number of seeds pod\(^{-1}\) and test weight than HFG 314, PLG 85 and HGS 296. Test weight of Durgajai and FS 277 did not differ significantly during both the years of study (Kacker et al., 1984).
Masood Ali (1982) found that Durgapur Safed and B 19-1-55 were on par with each other and produced more number of pods plant\(^{-1}\) than FS 277. Maximum pod length was recorded with guar cultivar HG 25, while it was found minimum with HG 7 (Sidhu et al., 1982). Among the three guar varieties tried viz., FS 277, Durgapur Safed and HFG 408, the highest number of pods cluster\(^{-1}\) was recorded with FS 277 during both years of study (Gill and Kanwar Singh, 1981).

**PERFORMANCE OF GUAR CULTIVARS ON YIELD**

Choudhary et al. (2006) inferred that guar cultivar RGC-986 produced significantly higher grain yield than RGC 1003, RGC-1017 and RGC-936 cultivars.

Lakshmi Kalyani (2006) reported that significantly higher seed yield was recorded with RGM 112, which was in parity with HG 563, while higher stalk yield was obtained with GAUG 9703 during *kharif* season. The pooled data revealed that cultivar RGC 197 gave higher seed yield than RGC 936 and RGC 986, while it was statistically at par with RGC 1003 (Sharma and Nehara, 2004).

Chauhan et al. (2004) inferred that guar cultivar HGS 870 produced significantly higher grain yield than RGM 115 and HGS 365 cultivars. Choudhary et al. (2004) found that out of 28 genotypes, the highest average seed yield was recorded with RGC 1012, while the lowest average seed yield was recorded with RGC 102.

Mean performance over three years in coordinated experiments indicated that genotype, RGM 112 gave significantly higher mean seed yield as against the check RGC 936 and HGS 365 (Bhansali and Bhandri, 2004). Shivran et al. (1996) reported that RGS 197 recorded significantly higher seed yield over RGC 936 and Durgajai.

Yadava et al. (1991) found that varieties HG 75 and HG 182 were significantly superior to FS 277, in terms of seed and stalk yield.

Among four guar cultivars tested, HG 258 recorded maximum seed and stalk yield, while PLG 85 recorded the lowest seed and stalk yield at IARI, New Delhi (Balyan and Jagdish Seth, 1989). Veena Jain et al. (1987) reported that guar cultivar HG 75 recorded 12.9 and 20.6 per cent higher seed yield than Durgajai cultivar in 1980 and 1981, respectively.

Ahmad et al. (1984) during their two years of study with five cultivars of guar, reported that the cultivar Hall recorded significantly higher seed yield than other cultivars. Panwar et al. (1983) found that HG 75 performed better than HG 182, FS 277, Durgapur Safed and HFG 408 at farmers field.

Sidhu et al. (1982) stated that guar genotype HG 11 recorded maximum seed yield, while HG 8 yielded the lowest.

Mahale and Jadhav (1982) observed that out of ten cultivars, Malosan, Durgapur Safed and B 22-3-35 gave higher seed yield of 0.5 to 0.62 t ha\(^{-1}\) in 1977 and 1.33 to1.56 ha\(^{-1}\) during 1978.

**PERFORMANCE OF GUAR CULTIVARS ON QUALITY PARAMETERS**

1. **Crude gum content and gum yield of seed**

Lakshmi Kalyani (2006) stated that RGM 112 produced significantly more gum content and yield hectare\(^{-1}\) as compared to HG 563, RGC 1003 and GAUG 9703.

Veena Jain et al. (1987) stated that significantly higher gum content was recorded in Durgajai as compared to HG 75 and HG 182. Among guar cultivars, B 19-1-55 recorded the highest gum content followed by Durgapur Safed and FS 277, under dry land conditions of Jhansi (Masood Ali, 1982).

Malik et al. (1981) stated that FS 277 produced significantly more gum hectare\(^{-1}\) as compared to Guar No.2. Das et al. (1977) observed that variety B 19-1-55 proved to be superior to FS 277, with respect to crude gum yield and crude gum content.
2. Crude protein content and protein yield of seed

Lakshmi Kalyani (2006) observed that out of 4 cultivars, RGC 1003 gave higher crude protein content compared to other cultivars.

Among the five guar varieties tried viz., IGFRI S-212, FS 277, HFG 199, HG 182 and HG 75, the cultivar HG 75 had the highest crude protein and the cultivar IGFRI S-212 contained the lowest crude protein content (Tripathi and Gill, 1988).

Guar variety HG 75 recorded significantly higher crude protein content and crude protein yield ha⁻¹ than Durgajai and HG 182 (Veena Jain et al., 1987). Jain and Dass (1984) reported that seed protein percentage varied from 30.04 to 35.04.

Patel et al. (1982) found that protein per cent in seeds of FS 277 and B 19-1-55 was in order of 32.9 and 34.5, respectively, but the difference was not significant. Tyagi and Bansal (1980) observed maximum crude protein content in guar cultivar PLG 20 followed by FS 277.

Summarizing the review undertaken, it is understood that the potential productivity of cluster bean could be achieved when it is sown at the first fortnight of July and among all the cultivars, Durgapur Safed being the most productive followed by FS 277 and HG 75, respectively.

REFERENCES


