**Agriculture for Sustainable Development 2(1):11-13, 2014/Article** ***ISSN 2347-5358 (Print)/ 2349-2228 (Online)***

**Agriculture for Sustainable Development**

**http://www.sustainableagriculture.in**

# GROWTH SUBSTANCES RESPONSE TO CLUSTERBEAN [*CYAMOPSIS TETRAGONOLOBA* L.] GROWTH PARAMETERS

**VIJERNDRA KUMAR* AND M. K. KAUSHIK[1]**

***Krishi Vigyan Kendra, Central Marine Fisheries Research Institute, Cochin, (Kerala) - 682 018, India***

**Received: 18.01.2014** **Revised accepted: 24.02.2014**

**ABSTRACT**

A Field experiment was conducted during *kharif* season of 2008 and 2009 to find out growth substances response to clusterbean growth parameters. Twenty eight treatment combinations i.e. four varieties (RGC-936, RGC-1002, RGC-1003 and RGC-1017) as main-plot treatment and seven growth substances (control, Seed treatment with thiourea 500 ppm, foliar application of thiourea 500 ppm, seed + foliar application of thiourea 500 ppm, seed treatment with TGA 100 ppm, foliar application of TGA 100 ppm and seed + foliar application of TGA 100 ppm) as sub-plot treatment was laid out in split-plot design with three replications. The results showed that in variety RGC-936 was observed significantly higher CGR and dry matter accumulation at 30, 45, 60 Days after sowing (DAS) and at harvest. The application of seed + foliar application of thiourea (500 ppm to each) brought significant improvement in growth parameters *viz.*, CGR, dry matter accumulation at 30, 45, 60 DAS and at harvest. RGR was observed that non-significant in all stages during crop growth period.

***Keywords:***
*Clusterbean, CGR, Dry matter, Growth substances, RGR*

## INTRODUCTION

Guar [*Cyamopsis tetragonoloba* (L.)] is a drought tolerant summer annual legume. Being a deep rooted and drought hardy, clusterbean has occupied large areas in arid and semiarid tracts. This crop is mainly grown in Rajasthan, Gujarat, Haryana, Punjab and Uttar Pradesh. Rajasthan ranks first in respect of both area and production, occupying an area of 30.94 lakh ha and production with 18.47 lakh ton with a productivity of 597 kg/ha during 2011-12 (ASD, 2013). Unlike the seeds of other legumes, guar seeds contains sufficient amount of galactomannan gum, which form a viscous gel in cold water. Guar gum has 5-8 times the thickening power of starch. It is used in textile, paper manufacture, stamps, cosmetics, pharmaceuticals, food products, e.g. bakery products, ice cream, stabilizer for cheeses and meat binder. Also it is used recently in oil wells, mining industries, explosives, and other industrial applications (Undersander *et al.*, 2006). On the other hand, guar is considered as an excellent soil improvement crop, like other legumes, with respect to available nitrogen, which improve yield of succeeding crops. Several researchers working on different crop have reported that the use of growth substances is one of the effective means of delaying the senescence of leaves as well as retarding the abscission of reproductive organs. Application of growth regulator also increase flower, fruit setting, grain filling and test weight in different crops. The use of agro-chemicals have been started to modify various metabolic or physiological processes to regulate plant growth. Several researchers working on different crop have reported that the use of growth substances is one of the effective means of delaying the senescence of leaves as well as retarding the abscission of reproductive organs. Application of growth regulator also increase flower, fruit setting, grain filling and test weight in different crops (Patel and Singh, 1980).

## MATERIALS AND METHODS

An experiment was conducted at the Department of Agronomy, Rajasthan College Agriculture, Udaipur during *kharif* seasons of 2008 and 2009. Twenty eight treatment combinations i.e. four varieties (RGC-936, RGC-1002, RGC-1003 and RGC-1017) as main plot treatment and seven growth substances (control, Seed treatment with thiourea 500 ppm, Foliar application of thiourea 500 ppm, seed + foliar application of thiourea 500 ppm, seed treatment with TGA 100 ppm, Foliar application of TGA 100 ppm and seed + foliar application of TGA 100 ppm) as sub-plot treatment was laid out in split-plot design with three replications. The soil of the experimental site was clay loam in texture and having 250.12 kg/ha alkaline permanganate oxidizable N (Subbiah and Asija, 1956), 17.04 kg/ha available P (Olsen *et al.*, 1954), 340.24 kg/ha 1 *N* ammonium acetate exchangeable K (Stanford and English 1949) and 1.17% organic carbon (Jackson, 1973). The pH of soil was 7.6 and bulk density recorded 1.46 Mg $m^{-3}$ in 0-30 cm soil depth.

## RESULTS AND DISCUSSION

### *Effect of cultivars*

Results show that during crop growth period in variety RGC-936 was recorded significantly higher relative

**Corresponding author email: kumar.laldla@gmail.com, [1]Maharana Pratap University of Agriculture and Technology, Udaipur (Rajasthan) - 313 001*

crop growth and dry matter accumulation at all the growth stages as compared to other varieties except RGC-1017, which was at statistically at par with RGC-936. This might be due to fast growth habit of variety RGC-936 and RGC-1017 which continuously increased in height relative crop growth and dry matter accumulation and also take less time taken by RGC-936 to mature than RGC-1017, RGC-1003 and RGC-1002. RGR was observed that non-significant in all growth stages (Table-1). Further the differential behavior among the varieties could be explained solely by the variation in their genetic makeup and their differential behavior under different conditions. This may because of the long duration and fast later growth of these cultivars and it was also evident by significantly higher crop growth rate at later stages of growth (Yadav, 2000; Meena *et al*., 2013).

***Effect of growth substances***

Seed treatment + foliar spray of thiourea and thioglycolic acid applied at initiation of branches and flowering stages brought about significant improvement in growth parameters in both years of experimentation. Seed treatment + foliar spray of 500 ppm of thiourea recorded higher value of growth attributes of clusterbean crop but this treatment was statistically at par with 100 ppm thioglycolic acid. It may also be noted that not only accumulation of dry matter was increased due to the effects of thiourea and thioglycolic acid spray, but translocation of dry matter as well as its efficiency were also found to be higher in crop plants sprayed with thiourea and thioglycolic acid as compared to unsprayed crop. Relative growth rate was observed that non significant in all stages during crop growth (Table-2). Thus, improvement in crop growth rate and dry matter accumulation is sufficient to indicate that dry matter partitioning was favorably influenced by thiourea and thioglycolic acid spray. The growth attributes increased under foliar as well as thiourea and thioglycolic acid may be attributed to the better availability of nutrients. In light of this observation it is fairly conceivable that thiourea might have stimulating the photosynthetic carbon fixation mechanism and hence might have increased canopy photosynthesis. Significant increased in dry matter accumulation obtained with thiourea treatment provide ample support to such effects. Since thiourea exhibits cytokinin like activity (Sahu *et al.,* 1993).

**Table 1 Dry matter accumulation influenced by varieties with growth substances at different growth stages of clusterbean**

| Treatment | Dry matter accumulation (g/ plant) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 30 DAS | | | 45 DAS | | | 60 DAS | | | At harvest | | |
| | 2008 | 2009 | Pooled | 2008 | 2009 | Pooled | 2008 | 2009 | Pooled | 2008 | 2009 | Pooled |
| ***Varieties*** | | | | | | | | | | | | |
| RGC 936 | 3.79 | 3.30 | 3.55 | 11.06 | 10.41 | 10.74 | 50.83 | 46.56 | 48.69 | 65.59 | 62.97 | 64.28 |
| RGC 1002 | 2.96 | 2.62 | 2.79 | 9.11 | 8.40 | 8.76 | 41.04 | 37.07 | 39.05 | 57.51 | 55.79 | 56.65 |
| RGC 1003 | 3.15 | 2.76 | 2.96 | 9.45 | 9.08 | 9.26 | 43.26 | 39.79 | 41.53 | 59.45 | 56.96 | 58.20 |
| RGC 1017 | 3.65 | 3.28 | 3.46 | 10.85 | 10.26 | 10.56 | 49.60 | 45.30 | 47.45 | 63.68 | 61.25 | 62.47 |
| CD (*P*=0.05) | 0.26 | 0.13 | 0.12 | 0.56 | 1.20 | 0.55 | 2.87 | 4.92 | 2.37 | 3.83 | 4.00 | 2.31 |
| ***Growth substances*** | | | | | | | | | | | | |
| Control (Water spray) | 2.34 | 2.10 | 2.22 | 7.08 | 6.87 | 6.97 | 31.76 | 29.93 | 30.84 | 50.90 | 48.49 | 49.70 |
| Seed treatment thiourea 500 ppm | 2.83 | 2.45 | 2.64 | 8.69 | 7.83 | 8.26 | 38.79 | 35.15 | 36.97 | 55.86 | 54.94 | 55.40 |
| Foliar application of thiourea 500ppm | 3.52 | 3.16 | 3.34 | 10.62 | 10.25 | 10.43 | 47.97 | 45.13 | 46.55 | 62.67 | 60.62 | 61.64 |
| Seed + foliar application of thiourea (500ppm each) | 4.28 | 3.87 | 4.07 | 12.56 | 12.35 | 12.45 | 58.50 | 53.48 | 55.99 | 69.56 | 65.97 | 67.76 |
| Seed treatment TGA 100ppm | 3.35 | 2.88 | 3.12 | 9.91 | 9.28 | 9.60 | 45.71 | 40.75 | 43.23 | 62.05 | 60.26 | 61.16 |
| Foliar application of TGA 100ppm | 3.23 | 2.75 | 2.99 | 9.46 | 8.63 | 9.04 | 43.93 | 38.46 | 41.19 | 61.26 | 59.37 | 60.32 |
| Seed + foliar application of TGA (100ppm each) | 4.17 | 3.72 | 3.94 | 12.53 | 11.56 | 12.05 | 56.63 | 52.36 | 54.50 | 68.58 | 65.05 | 66.81 |
| CD (*P*=0.05) | 0.21 | 0.14 | 0.11 | 0.70 | 0.74 | 0.44 | 2.48 | 3.07 | 1.69 | 3.67 | 3.70 | 2.23 |

**Table 2 Effect of varieties and growth substances on crop growth rate and relative growth rate of clusterbean**

| Treatment | Crop growth rate (g $m^{-2}$/day) | | | | | |
|---|---|---|---|---|---|---|
| | 30-45 DAS | | | 45-60 DAS | | |
| | 2008 | 2009 | Pooled | 2008 | 2009 | Pooled |
| ***Varieties*** | | | | | | |
| RGC 936 | 16.16 | 15.81 | 15.98 | 88.36 | 80.34 | 84.35 |
| RGC 1002 | 13.67 | 12.86 | 13.26 | 70.95 | 63.69 | 67.32 |
| RGC 1003 | 14.00 | 14.03 | 14.01 | 75.15 | 68.26 | 71.70 |
| RGC 1017 | 16.01 | 15.52 | 15.76 | 86.11 | 77.86 | 81.99 |
| CD (*P*=0.05) | 1.01 | 1.52 | 0.76 | 5.26 | 8.29 | 4.09 |
| ***Growth substances*** | | | | | | |
| Control (Water spray) | 10.53 | 10.60 | 10.56 | 54.85 | 51.24 | 53.05 |
| Seed treatment thiourea 500 ppm | 13.01 | 11.97 | 12.49 | 66.89 | 60.71 | 63.80 |
| Foliar application of thiourea 500ppm | 15.77 | 15.77 | 15.77 | 83.00 | 77.52 | 80.26 |
| Seed + foliar application of thiourea (500ppm each) | 18.40 | 18.84 | 18.62 | 102.09 | 91.39 | 96.74 |
| Seed treatment TGA 100ppm | 14.57 | 14.23 | 14.40 | 79.56 | 69.92 | 74.74 |
| Foliar application of TGA 100ppm | 13.84 | 13.05 | 13.44 | 76.59 | 66.31 | 71.45 |
| Seed + foliar application of TGA (100ppm each) | 18.59 | 17.42 | 18.00 | 98.00 | 90.68 | 94.34 |
| CD (*P*=0.05) | 1.12 | 1.40 | 0.77 | 4.49 | 5.67 | 3.09 |

## REFERENCES


ASD, 2013. Vital Agriculture statistics Directorate of Agriculture, Pant Krishi Bhavan, Rajasthan, Jaipur.

Jackson, M.L. 1973. *Soil Chemical Analysis.* Prentice Hall of India Pvt Ltd, New Delhi.

Meena, R.S., Yadav, R.S. and Meena, V.S., 2013**.** Heat Unit Efficiency of Groundnut Varieties in Scattered Planting with Various Fertility Levels. *The Bioscan.* **9**(1): 1189-1192.

Olsen, S.R., Cole C.V., Watanabe, F.S. and Dean, L.A. 1954. Estimation of available phosphorus in soils by extraction with sodium bicarbonate. USDA Circ. No. 939, Washington

Patel, J.C. and Singh, R.M. 1980. Effect of irrigation, mulching and bioregulators on the production of sunflowers. Indian Journal of Agronomy 25:122-128.

Sahu, M.P., Solanki, N.S. and Dashora, L.N. 1993. Effect of Thiourea, thiamine and ascorbic acid on growth and yield of maize (*Zea mays* L.). *Journal of Agronomy and Crop Science* **171**: 65-69.

Stanford, S. and English L. 1949. Use of flame photometer in rapid soil tests for K and Ca. *Agronomy Journal* 41: 446–7.

Subbiah, B.V. and Asija, G.L. 1956. A raped processor of determination of available nitrogen in nitrogen in soil. *Current science* 25:259-260.

Undersander, D.J., Putnam, D.H., Kaminski, A.R., Kelling, K.A., Doll, J.D., Oplinger, E.S. and Gunsolus, J.L. 2006. Alternative Field Crops Manual, University of Wisconsin-Madison.pp 34-38.

Yadav, N.S. 2000. Response of oat (*Avena sativa* L.) to levels of nitrogen, cutting management and foliar spray of Thiourea. Ph.D. Thesis, Rajasthan agricultural University, Bikaner.