Effect of Growth Regulators and Nutrients on Physiological and Biochemical Parameters in Blackgram

B M Varma, P Jayarami Reddy, K Jayalalitha and P Prasuna Rani

Department of Plant Physilogy, Agricultural College, Bapatla- 522101, Andhra Pradesh

ABSTRACT

An experiment was conducted during rabbi 2005-06 to know the effect of growth regulators and nutrients i.e. GA_3,NAA KNO_3 , Urea , SA , and Triacontanol on physiological and biochemical parameters of blackgram at Agricultural college Farm, Bapatla . The variety used for this study was LBG-623. Treatment KNO_3 @ 1 % significantly increased the total dry matter production, leaf area, leaf are index, AGR, CGR, RGR and NAR values. Biochemical parameters such as total chlorophyll content, NR activity and protein content were recorded maximum with KNO_3 @ 1 % treatment.

Key words : Blackgram, Growth regulators, Physiological and Biochemical Parameters.

Plant growth regulators are organic substances which in minute quantities increase or modify physiological processes in plants which are finally expressed in the form of growth and development (Taiz and Zeiger, 2003).

Nutrients also plays a vital role in increasing physiological and biochemical parameters . Certain chemicals like Urea and KNO_3 in the place of nitrogen and potassium have been reported in improving physiological and biochemical parameters. Patra et.al . (1995) ported that KNO_3 @ 0.5 % and Urea @ 2 % increased CGR values in groundnut, Kaur and Jagetiya (2005) stated that KNO_3 @ 2% increased nitrogen content and protein content in soybean seeds . Therfore an experiment was attempted with different growth regulators and nutrients to study the effect on physiological and biochemical parameters in blackgram.

MATERIAL AND METHODS

A field experiment was conducted at Agricultural college Farm , Bapatla (AP) during rabi November, 2005 to Februdry, 2006. The experiment was laid out in a randomized black design with three replications and 10 treatments . The treatments consists of T1-GA_3 @ 2.5 ppm, T2-GA_3 @ 5.0 ppm, T3-NAA @ 10 ppm, T4-NAA @ 15 ppm, T5-KNO_3 @ 1 %,T6-Urea @ 2 %, T7-SA @ 10 ppm T8-Triacontanol @ 1.5 ppm, T9-water spray and T10-control. The treatments were given both as seed soaking and foliar spray. Foliar sprays were imposed at 50 % flowering and 10 days thereafter . The variety used for this study was LBG-623 . A spacing of 30 x10 cm was adopted .The cultural and agronomic measures were taken as and when necessary. The data on various physiological and biochemical parameters were recorded and stastically analyzed.

RESULT AND DISCUSSION

The data pertaining to physiological parameters like leaf area, LAI, AGR, CGR ,RGR,NAR were presented in Table 1.

The leaf area differed significantly among the treatments and more leaf area was recorded with KNO_3 @ 1% (589.26 cm^2) and low in control (490.29cm^2). Sabale (2002) stated that nitrogen @ 50 kg ha^{-1} half through Urea and half through FYM increased leaf area in groundnut .

The treatment KNO_3 @ 1% recorded maximum values which respect to leaf area index (1.964) as against control (1.627). Jayarami Reddy et al (2004) revealed that leaf area index increased with foliar spray of KNO_3 @ 1% in blackgram . The AGR has also differed significantly among treatments. KNO_3 @ 1% recorded maximum AGR values (528.66) as compared to control (454.00) .

The CGR values showed significant difference with reference to treatments . KNO_3 @ 1% recorded maximum CGR values (1.585) and control recorded lowest (1.291) . Patra et .al (1995) studied that KNO_3 @ 0.5% and Urea @ 2 % increased CGR values in groundnut .

The treatment KNO_3 @ 1% recorded highest values with regard to RGR (30.80) which was lowest in control (26.24).

NAR values weremaximum in KNO_3 @ 1% treatement (0.968) and control recorded lowest values (0.919) . Subba Rao (1997) reported that SA @ 50 ppm increased NAR values in blackgram .

The data on the biochemical parameters *vig.,* chlorophyll content a,b, total chlorophyll content , NR activity and seed protein conted were presented in Table 2.

Table 1. Effect of Pre Sowing Treatments with Growth promoting Chemicals of Physiological Parameters in Blackgram at Maturity.

Treatments	Leaf area (cm^2 plant^{-1})	Leaf area Index	AGR (mg d^{-1})	CGR (mg cm^{-2} d^{-1})	RGR (mg g^{-1} d^{-1})	NAR (mg cm^{-2} d^{-1})
GA$_3$ @ 2.5 ppm	586.34	1.954	514.00	1.542	29.46	0.949
GA$_3$ @ 5.0 ppm	583.54	1.945	510.66	1.531	28.33	0.936
NAA @ 10 ppm	584.10	1.947	511.33	1.533	28.53	0.940
NAA @ 15 ppm	587.06	1.956	517.33	1.551	29.93	0.955
KNO$_3$ @ 1%	589.26	1.964	528.66	1.585	30.80	0.968
Urea @ 2%	588.11	1.960	520.66	1.561	30.00	0.958
SA @ 10 ppm	582.46	1.941	501.33	1.503	28.06	0.931
Triacontanol @ 1.5 ppm	585.41	1.951	512.00	1.536	28.86	0.945
Water spray	580.86	1.936	498.33	1.494	27.16	0.924
Control	490.29	1.627	454.00	1.291	26.24	0.919
SEm +	30.87	0.10	15.44	0.07	NS	NS
CD @ 5%	91.69	0.31	45.86	0.21	NS	NS
CV (%)	9.38	9.81	5.29	8.44	-	-

Table 2. Effect of Pre Sowing Treatments with Growth promoting Chemicals on Biochemical Parameters in Blackgram at Maturity.

Treatments	Chlorophyll 'a' content (mg g^{-1}) at maturity	Chlorophyll 'b' content (mg g^{-1}) at maturity	Total Chlorophyll content (mg g^{-1}) at maturity	NR activity (μm mg^{-1} fresh wt.h^{-1}) at maturity	Seed protein content (%)
GA$_3$ @ 2.5 ppm	1.250	1.060	2.310	153.67	23.50
GA$_3$ @ 5.0 ppm	1.220	1.046	2.266	150.36	22.75
NAA @ 10 ppm	1.226	1.050	2.276	152.54	23.00
NAA @ 15 ppm	1.370	1.069	2.439	154.71	23.75
KNO$_3$ @ 1%	1.387	1.101	2.488	158.13	24.37
Urea @ 2%	1.380	1.075	2.455	156.21	24.00
SA @ 10 ppm	1.214	1.042	2.256	149.05	22.56
Triacontanol @ 1.5 ppm	1.235	1.055	2.290	151.24	23.25
Water spray	1.210	1.038	2.248	148.25	22.18
Control	1.201	0.881	2.082	133.00	21.93
SEm +	0.04	0.05	0.09	5.38	NS
CD @ 5%	0.12	0.16	0.28	15.98	-
CV (%)	5.63	9.35	7.09	6.20	-

The total chlorophyll content showed significant differences among treatments . KNO_3 @ 1% recorded maximum total chlorophyll content values (2.488) as against control (2.082). Kaur and Jagetiya (2005) observed that KNO_3 @ 2% increased chlorophyll content in soybean .

The NR activity content in leaves also showed significant differences with reference to different treatments . Maximum NR activity of leaves were recorded by KNO_3 @ 1% (158.13) and control recorded lowest (133.00). Sharma and Agarwal (2002) stated that KNO_3 @60 kg ha^{-1} recorded maximum NR activity in leaves of *Cicer arietinum*.

The treatment KNO_3 @ 1% recorded maximum values with respect to protein content in seed (24.37) as against control (21.93). Kaur and Jagetiya (2005) reported that KNO_3 @ 2% increased protein content seed of soybean .

From the above it appears that seed soaking and foliar spray of KNO_3 @ 1% could favolably influence the physiological and biochemical parameters in blackgram .

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