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Effect of Benzyladenine on physiological and Chlorophyll changes of Artificial Drought Stress in Maize Seedlings.

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ABSTRACT
Investigations were carried out at Department of Biochemistry, B. A. College of Agriculture, Anand Agricultural University, Anand to study the physiological and chlorophyll characterizations of two maize genotypes (resistant and susceptible) procured treatment given to seed followed by artificial drought (PEG) stress at 15 DAS. However, resistant genotype showed better performance in higher root-shoot length and weight than susceptible genotype under drought stress conditions, through treatment BA was higher root-shoot length and weight in resistant and susceptible genotypes. Biochemical analysis was carried out total chlorophyll content were increased in both the genotypes (resistant and susceptible) due to drought stress. Application of BA (25 ppm) could be increased in total Chlorophyll content and physiological parameters for improved biochemical content in both genotypes. Due to drought stress length and weight of root, shoot were decreased in maize seedlings of both the genotypes.
***Key words**: Physiological, Chlorophyll, PEG, Maize,Zea mays L.*

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INTRODUCION

Maize (*Zea mays L.*) is the third most important cereal crop after wheat and rice all over the world. Taxonomically, *Zea mays* L. belongs to tribe *Maydeae,* family *Poaceae* and genus *Zea*. It is believed that *Zea* might be derived from old Greek name *Zola* named for food grass. The other *Zea* species, referred to as *teosintes* are largely wild grasses native to Mexico and Central America [2]. The center of origin for *Zea mays* (2n=20) has been established as the Mesoamerican region, now Mexico and Central America [4]. Benzyladenine (BA) is the synthetic form of Cytokinins (CKs) known to regulate several aspects of plant height growth and development, including the response of plants to abiotic stress [3]. Benzyladenine with seed treatment increases the growth rate and pod yield under moisture stress compared to water soaked seeds.

MATERIAL AND METHODS

Two maize Cultivars CM-500 (Resistance) and GYC-9327 (Susceptible) and cultivars were raised in pot with three replications. Fifteen days old seedlings were treated with 10, 15 and 20 % PEG-6000 induced water deficit stress. Prior to this induction of stress seeds were treated with 25 ppm benzyladenine for one hour. There were eight treatments (**T_1**– Control, **T_2**- PEG- 6000 (10%) treatment, **T_3**- PEG- 6000 (15%) treatment, **T_4**- PEG- 6000 (20%) treatment, **T_5**- Seeds treatment with Benzyladenine (25 ppm) for 1h., **T_6**- Seeds treatment with Benzyladenine (25ppm) + PEG (10%), i.e. T_2+T_5, **T_7** - Seeds treatment with

Benzyladenine (25 ppm) + PEG (15%), i.e. T_3 + T_5, **T_8**-Seeds treatment with Benzyladenine (25 ppm) + PEG (20%), i.e. T_4 + T_5. This eight treatments were divided into two groups First groupT_1 to T_5 to study the effect of PEG stimulated water stress and second group treatments T_5 to T_8 observed the effect of benzyladenine under PEG induced water deficit stress. The seedlings were analysed for biochemical and physiological parameter.
Preliminary experiment was carried out to find out suitable concentration of BA bases on the germination percent of 25 ppm concentration found best which was selected for the further study. Before sowing seeds of both genotypes were treated with 25 ppm Benzyladenine (BA) for 3 hour and dried for 30 min. The seeds were then germinated in under laboratory condition artificial drought stress was induced by polyethylene glycol (PEG-6000). The 15 days after sowing (DAS) seedlings were taken into conical flask containing PEG-6000 (10 %, 15% and 20%) and artificial drought induced for 24 hrs. After 24 hrs seedlings were collected for theirbiochemicaland physiological.

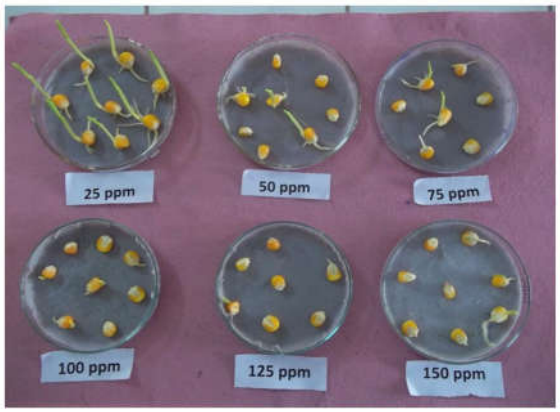

Fig 1: Suitable concentration of BA bases on the germination percentage of maize seeds

Fig 2: Suitable concentration of BA and PEG bases on the 15 DAS of maize seedling

Table 1 : Chlorophyll changes of maize seedling in 15 DAS

Treatments	Total chlorophyll (mg/g)		Chlorophyll a(mg/g)		Chlorophyll b (mg/g)	
	CM 500	GYC 9327	CM 500	GYC 9327	CM 500	GYC 9327
T_1 (Control)	3.90	3.53	2.07	1.85	1.83	1.68
T_2 (PEG 10%)	3.46	3.05	1.88	1.66	1.58	1.39
T_3 (PEG 15%)	3.08	2.65	1.65	1.46	1.43	1.19
T_4 (PEG 20%)	2.44	2.18	1.23	1.17	1.21	1.01
T_5 (BA)	4.25	3.96	2.38	2.04	1.87	1.92
T_6 (BA + 10 %PEG)	3.84	3.33	2.00	1.74	1.84	1.59
T_7 (BA + 15 %PEG)	3.57	3.02	1.92	1.59	1.65	1.43
T_8 (BA + 20 %PEG)	2.98	2.91	1.58	1.51	1.40	1.40
Sem	0.086	0.071	0.067	0.08	0.06	0.06
C. D.	0.26	0.21	0.21	0.25	0.17	0.19
CV %	4.33	3.97	6.31	8.72	6.05	7.56

Table 2 : Physiological changes of maize seedling in 15 DAS

Treatments	Root length (cm)		Shoot length (cm)		Root weight (gm)		Shoot weight (gm)	
	CM 500	GYC 9327	CM 500	GYC 9327	CM 500	GYC 9327	CM 500	GYC 9327
T_1 (Control)	20.73	17.27	15.03	13.93	1.83	1.17	1.13	1.01
T_2 (PEG 10%)	20.57	17.10	14.67	13.87	1.17	0.97	1.00	0.89
T_3 (PEG 15%)	20.30	16.90	14.50	13.70	0.93	0.83	0.94	0.77
T_4 (PEG 20%)	20.03	16.73	14.00	13.33	0.74	0.50	0.80	0.70
T_5 (BA)	20.90	17.33	15.83	14.23	2.00	1.59	1.29	1.16
T_6 (BA + 10 %PEG)	20.73	17.23	15.00	13.97	1.38	1.03	1.11	0.98
T_7 (BA + 15 %PEG)	20.50	17.03	14.78	13.83	1.10	0.95	1.09	0.87
T_8 (BA + 20 %PEG)	20.37	16.83	14.67	13.80	0.97	0.83	1.01	0.84
Sem	0.59	0.32	0.32	0.35	0.08	0.06	0.05	0.04
C. D.	NS	NS	NS	NS	0.23	0.18	0.16	0.13
CV %	4.71	3.27	3.69	4.34	10.54	10.73	9.05	8.14

RESULT AND DISCUSSION

Total Chlorophyll content:

The decrease in total chlorophylls content was observed in resistant (CM-500) and susceptible (GYC-9327) genotypes under drought stress conditions compared with the control condition. The data presented in (Table 1). Both resistant and susceptible genotypes showed total chlorophylls content in treatment T_5 (4.25 % and 3.96%). The lowest total chlorophylls content was observed in treatment T_4 (2.44 % and 2.18%), in both resistant and susceptible genotypes.

The total chlorophylls content was decreased with PEG induced drought stress in both the genotypes (treatment T_2, T_3 and T_4) ascompared to control, whereas chemical benzyladenine (BA) soaked seed treatment (T_5) showed total chlorophylls content as compared to control and drought stress. However, combined effect of BA and PEG treatment was increased total chlorophylls content of both genotypes in treatments T_6, T_7 and T_8 respectively as compared to drought stress.These results were agreement with Dhruve and Vakharia [1], who reported that chemical treatment BA soaked seed was significantly highest chlorophyll content than control.

Physiological attributes such asRoot-shoot length and weight reduction was observed under stress condition in both genotypes. The data was tabulated in (Table 2). Polyethylene glycol (PEG) treatment decreased available water required for plant growth.

Root lengthof both susceptible and resistant maize genotypes were decreased under drought stress conditions. Both resistance and susceptible genotypes found longer root length in treatment T5 (20.90 cm and17.33 cm), and shoot length in treatment T5 (15.83 cm and 14.23 cm) whereas lower root length was observed in treatment T4 (20.03 and 16.73 cm, respectively) and shoot length (14.00 cm and 13.33 cm),respectively.

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