IOSR Journal of Agriculture and Veterinary Science (IOSR-JAVS)
e-ISSN: 2319-2380, p-ISSN: 2319-2372. Volume 10, Issue 12 Ver. II (December 2017), PP 51-56
www.iosrjournals.org

Role of Bread Yeast and Anti-transpiration in some Indicators of Vegetative Growth of Maize under Water Stress

[1]Basheer AbdalaAbraheem&[2]Kawther Khalid Majed*
[1]*Lecturer Crop Sci. Dept.-College of Agriculture- University of Baghdad.*
[2]*Researcher*

Abstract: *Field experiment was Carry out in Field of Croup department- College of agriculture at Autumn Season 2016. The aim of this study to provide Corn varieties with Induces the tolerate drought. The Randomized Complete design (RCBD) was used with arrangement split plot by three Replicates, The main Factor (Soil moisture stress), with Irrigation (100%) as Control, 75, 50% that mean to reduction 25, 50% from water Quantity at Control treatment. The Second treats Includes: Injection Yeast Bread in the soil with Concentration 8g L^{-1}, anti- transpiration 5ml L^{-1}, and spread of distilled water (Control). The results were shown significant decreases in most of vegetative growth and increasing Level stress to 75, 50% such as dry weight Leaves, there area, with chlorophyll content at flowering and maturity stages, relative water content, percentage loss of the water from leaves, stability of cell membranes, root size, root/shoot ratio and relative rate growth. The yeast Bread gives significant in leaf area, dry weight with increased percentage 12.10, 6.91 respectively, while the chlorophyll content at 50% flowering. Physiological maturity about 68.72, 43.55% respectively, cell membranes index 64.25%, root size 25.00%, relative growth rate 28.50%, compared with control, anti-transpiration increased the relative water to the leave about 18.50 compared with control treat.*

Key words:*bread yeast, anti-transpiration, maize, water stress*
**Extracted from the master's thesis for the second researcher*

Date of Submission: 12-12-2017 Date of acceptance: 30-12-2017

I. Introduction

Maize is one of important cereal Crops, the problems is faced of the word that which is decreased of quantity of the water that lead to threat food security in the future and croup production (Aslam et al ,2013). The water stress contributed in problem of food shortage reflected et to Metabolism process and decreasing of plant production (Zhang et al,2000) .In some arid and semi-arid regions, Like Iraq the heat temperature caused problem of sufficient water because the increasing of viscosity of the protoplasmic Increased with Increasing of drought level(Mohammed, AL-younes,1991). The Impacts of drought on plant process are relied on plants stage, period of subjected to drought and interaction of environmentalfactors, the use of anti-respiration is represented mechanical solution to decrease the Loss of water, but there are nutrientstress (that mean unavailable of elementnutrients in the soil Solution). The disruption in hormone balance in the plant. The aim of this study to encourage plant resistance to drought stress by using bio factor Like yeast bread, the bio fertilizers are acquired to safety of environment and increased of diversity of Microbiology, also their role in soil fertility, and encourage the growth of plant because of their content from protein,vitamin Thiamine,Riboflavin,periodoxine,vitamins,Amino acids(Hegab,1997),also release CO_2 that willreflected to improved het of photosynthesis rate (Ahmed,1990),plant regulators such as Cytokinin,Auxin and Gibberellins and increased of chlorophyll content(El-Greadly, El-Tohamy).Anti-respirationcontributed to close of stomata and lead to balances of water in plant.

II. Material and Method

Afield experiment was conducted in field of college of Agriculture university of Baghdad .In Autumn season to reduce of drought stress on maize-plants(*Zea Maize* L.) cultivar 5018 by providing bio fertilizer (Yeast bread)to the soil .Random Block design was used with arrangement split plot by three replicates. The water treatment were distribution on main plots, while Yeast bread and control were irrigated by using pipes (0.5Inch). DAP fertilizers are supplied at sowing date 400k/h(AL-Alusi,2005),and the Urea formulizer are supplied in two time the first one at tiller stage, and the second at flowering stage(400k/h)(General Authority for Extension and Agricultural Cooperation,2011).The maze seedsare planted by using distance 20*75cm. The plants are harvested and dried in oven at 70˚cuntil to steady weight then the volumetric method was used to urea the soil moisture, where samples are taken by core sample before Irrigated and weighted the sample to take wet

weight of the soil, and then placed in the micro-wave for 10miutes to dry it and weighted, estimated moisture content according of equation (1980, Hilled).
Mass of loss water=soil wet weight –soil wet dry
Wet soil percentage= (Mass of loss water/dry soil)×100
Q=pw×Pb
Q=Moisture content based on volume
Pw=Moisture content based on weight
Pb=virtual density

Treatments
1- Treatment of moisture stress (main treats)
1- Full irrigation 100% from water available amount (control)
2- Irrigation with 75%from water available amount.
3-irregation with 50% from water available amount
The treatmentswere irrigated in the same time to reach the control treatment to 50% moisture from available water.
2- Second treatment
1- Yeast treatment (*Saccharomyces cerevisiae*) Injected of soil (yeast extraction) with concentration 8 $g.L^{-1}$ and injected 20 ml per plant with 15-20 cm.
2- Anti-transpiration commercial Armourax with a concentration of 5 ml L^{-1}.
3- The controltreatment (moisture stress) after plant to 8 leaves age and then treated.

Traits of study
1- Leafarea (cm^2/plant). Measured according to Elsahookie equation (1991)
$LA= 0.75\times L^2$
2- Dry leaves
3- Chlorophyll content at 50% flowering and 50% physiological maturity according to (Arhon, 1949).
T.chl. = [(7.12×A660) + (16.8×A642.5)] ×V/ (W×100)
4- Relative water content (RWC) according to.
RWC= (FW-DW/ TW-DW) ×100
5- Percentage of water Loss according to (Clarke et al, 1989)
LWL ($mgcm^{-2}min^{-1}$) = [PF1-PF2/ (30×SF)] ×100
6- Membrane stability Index MSI
taken ear leaf from each treatmentat flowery stage and cutting to small pieces with diameter 2 cm and taken 20 pieces and then wash them more-times and partition into tubes(pieces for each tube), and supplied 20 ml from distill water and shacked for 24 hours (C_1). While the second tube placed the Autoclave under 120c̊ for 20 minutes (C_2), and extract the water Solution, then estimate the EC for each them under room temperature, and applied the equation (AL-Deshmukh et al, 1991)
$MSI=1-(EC_1/EC_2)\times100$
7- Root: after removed the clay in the root, placed in cylinder with capacity 2 Liter after placed quantity of water and placed the root in the cylinder, the height of water represented root volume.
8- Root/ Shoot ratio
9- Relative growth rate ($g.g^{-1}.day^{-1}$) estimated according to (Hut and Cornelissen, 1997).
$R.G.R= (lnW_2 – lnW_1)/ (T_2-T_1)$.

III. Results and discussion

Leaf area and dry weight leaves

Table(1,2) shown the decrease of leaf area and dry weight of leaves of water stress deficit stress in that 50 and 75% about 13.63 and 36.07 respectively in leaf area and dry leaves approximately 17.78 and 26.87 and 100% Irrigation respectively. The decrease of water quant effects on leaf area, dry weight because of reduce of photosynthesis and close of stomata with rolling leaves (Kramer, 1989). This mean reduction ofmetabolites thatwere required to the growth, as well as other of effects between chemical effects such as Increased of Free radicals and sufficient of nutrient element, while physical effects such as reduction of turgor pressure, required that are to the growth and change of permeability in cell membrane which reduction of leaf area and its weight (AL-Ghanami et al, 2015). The Irrigation of maize with 100% of Field capacity, that was gave highest values for the traits compared to 50% field capacity. While yeast bread gave significant effect in the leaf area and dry weight leaves as percentage 13.77, 6.91%respectively compared to control treatment, yeast bread Characteristics by encouraging of the growth because of their content from proteins, vitamin B, Thiamine, Riboflavin, Auxin and Gibberellin, because of the effects of Cytokinesis play role ininduction, of cell expansion

with Auxin and Gibberellins (Attia and Jadoa, 1999). While the treatment 100% Irrigation with yeast bread gave the highest mean to the leaf area and weight leaves as a percentage 96.63, 51.73% respectively compared to lowest mean of drought stress 50%.

Table 1. Effect of study factors in the leaf area m2.plant-1

Water Stress	Control	Armoura x	*S. cerevisia*	Mean
%100	**0.542**	**0.582**	**0.641**	**0.572**
%75	**0.499**	**0.511**	**0.541**	**0.494**
%50	**0.323**	**0.355**	**0.370**	**0.366**
l.s.d		**0.071**		
Mean	**0.455**	**0.483**	**0.517**	
l.s.d		**0.033**		

Table 2. Effect of study factors in Dry weight of leaves (g.)

Water Stress	Control	Armourax	*S. cerevisia*	Mean
%100	**64.09**	**65.73**	**67.84**	**67.54**
%75	**51.38**	**49.90**	**52.14**	**55.53**
%50	**44.71**	**46.68**	**51.26**	**49.39**
l.s.d		**5.83**		
Mean	**53.39**	**54.10**	**57.08**	
l.s.d		**3.24**		

Chlorophyll content 50% of flowering and maturity stage

Table(3,4) Shown That Moisture stress decrease the chlorophyll content significantly at 50% flowering and physiological maturity 19.32, 28.95% ,18.07and 34.05% for two Level of stress 75 and 50% respectively. The decreasing of water quantity the plant pigment such as chlorophyll will be effected because of the chlorophylls and the Mg^{++} will be removed by activation ofCatalase. The porphyry in circle will be dispendbyDioxygenase, while the Iron oxidase on the Iron oxidation, where the stability of chlorophyll content at physiological maturity stage more than importance at first stage of growth due to the grain filling needs source more activity. The yeast was significantly in Chlorophyll content at 50% flowering and physiological maturity approximately 68.72, 43.55% respectively compared to control, It will be Increased from major and minor nutrient elements as Iron and Magnesium that which Contributed in rebuilt of chlorophyll Molecule, as well as Increasing of Nitrogen Content, phosphorus and Potassium in the leaves, In addition to, the role of plant regulators produced by yeast bread such asCytokinin that will preserve of chlorophyll Molecule, where there of Cytokinin play in delay of senescence of leaves and for Mediation of protein and RNA. The anti- respiration treatments are gave high significant in chlorophyll content compared to control at 50% flowering and physiological maturity. While 100% yeast gave highest mean of chlorophyll content at 50% flowering and physiological maturity as 154.75 and 128.75% respectively compared to moisture stress 50% of water Irrigated. This report to the role of yeast bread to the Increase of tolerant plant to drought stress.

Table 3Effect of the study agents on the content of the leaves of chlorophyll (Mg^{-1}.g soft $weight^{-1}$).

Water Stress	Control	Armoura x	*S. cerevisia*	Mean
%100	**18.39**	**20.73**	**29.22**	**22.97**
%75	**13.37**	**17.30**	**22.19**	**18.53**
%50	**11.47**	**14.12**	**21.57**	**16.32**
l.s.d		**1.95**		
Mean	**14.42**	**17.39**	**24.33**	
l.s.d		**1.00**		

Table 4 Effect of Study Agents on Chlorophyll Stability (Mg^{-1}.g soft $weight^{-1}$) in physiological maturity.

Water Stress	Control	Armoura x	*S. cerevisia*	Mean
%100	**14.18**	**18.03**	**27.13**	**19.53**
%75	**14.93**	**16.33**	**17.02**	**16.00**
%50	**11.86**	**14.12**	**14.67**	**12.88**
l.s.d		**3.035**		
Mean	**13.66**	**16.16**	**19.61**	
l.s.d		**19.61**		

Relative of water content (RWC), Loss water leaves and membrane stability Index MSI

Table(5,6,7) shown that Increase Moisture stress decrease from Relative of water content(RWC), Loss water leaves and membrane stable Index significant treatment of moisture stress 75 and 50% about 10.36, 29.54% and 43.04, 68.33% Respectively compared to control treatment, with Increase of water stress the RWC will decreased in leaves because the differential between respiration and absorption, where the plant make to balance of water by closed the stomata .The studies of (Zoghmar and youcef,2014) shown the decrease of relative of water content in wheat leaves drought density with preserve the relative water compared to control 100%. The results of (AL- Dessouki, 2009) that the subjected of maize plants to stress that would decrease relative of water content, which the block of Irrigation at elongation stage and primordial of ears. The important Mechanism to stay of plant under drought stress todecreasethe loss of water from stomata (Oppenheimer, 1960). While studies of Valentovič et al (2006) shown the highest value in the percentage of Loss leaves of the water in the Sensitive cultivar of the maize CV.Ankora Compared to resistance cultivar to drought (CV.Nova), membrane stability leave effect by drought, level leaf age (Bandurska et al, 1995), while the Sayer et al (2008) report to significant difference between sensitive cultivars in Wheat at membrane Stability compared to resistance cultivars.

The treatments of yeast and respiration increasing of relative of water content, and also gave highest value as percentage 23.18, 18.50% compared to control and yeast treatment gave of Loss water leaves about

38.20% in addition to give highest Value in the Stable of membrane Index compared to other treatments as percent 64.25%, characters of yeast that is encouraged of plant growth, due to their content of Proteins, Vitamin B, Thiamine , Riboflavin, peroxidein, vitamins, amino acids,Cytokinin, Auxin, Gibberellin and others effect on prevent of free radical oxidation, and Osmotic Adjustment that would produce by yeast as well as produced plant hormones such as Cytokinin that preserve of DNA and chlorophyll Molecule, that would produce Sugars to control on Osmotic potential in the Cells, that which lead to loss of water.

Table 5.Effect of Study Factors on Relative Water Content (%)

Water Stress	Control	Armourax	*S. cerevisia*	Mean
%100	**80.93**	**87.27**	**84.48**	**83.78**
%75	**64.88**	**80.78**	**85.21**	**75.71**
%50	**43.37**	**56.14**	**63.34**	**59.03**
l.s.d		N.S.		
Mean	**63.06**	**74.73**	**77.68**	
l.s.d		**5.952**		

Table 6.Effect of study agents on leaf loss ratio .($mg^{-1}.cm^{2}.min^{-1}$)

Water Stress	Control	Armourax	*S. cerevisia*	Mean
%100	**0.428**	**0.255**	**0.336**	**0.319**
%75	**0.357**	**0.236**	**0.355**	**0.313**
%50	**0.352**	**0.241**	**0.264**	**0.264**
l.s.d		**0.049**		
Mean	**0.379**	**0.244**	**0.318**	
l.s.d		**0.028**		

Table 7.Effect of Study onMembrane stability Index MSI.

Water Stress	Control	Armourax	*S. cerevisia*	Mean
%100	**51.13**	**60.41**	**83.55**	**65.41**
%75	**28.09**	**39.82**	**44.77**	**37.26**
%50	**14.46**	**20.43**	**25.51**	**20.71**
l.s.d		**9.20**		
Mean	**31.22**	**40.22**	**51.28**	
l.s.d		**21.45**		

Root size

The Table (8) showed that increasing of moisture stress significant in decrease of root size approximately 53.58, 63.96% at 75 and 50% respectively. This shown size of damage that which are Occurred under moisture stress in the exceed the ratio of damage to the shoot at levels of stress. Thisindicate that size of organs of plant result of the cell expansion and Osmotic pressure that establish from water and solutes in vitro cells, as well as represent Less of Sugars toincrease of Osmotic potential in the cells of roots, this lead to disruption of hormonal balance because of less amount of Water and inhibition of growth with reduction of activators and changes of permeability of membrane due to destruction free-radicals. The yeast treatment gave significant differences in root size as 25% compared to control. This provides supporting to the roots that which more activity than Shoot spray by using anti- respiration materials. While the recombination 100% water irrigation and yeast gave highest value of the root size as percent 300.70% compared to Moisture stress 50% water Irrigation**.**

Table8.Effect of study factors on root size (cm^{3}. plants $^{-1}$).

Water Stress	Control	Armourax	*S. cerevisia*	Mean
%100	168.9	154.4	169.9	161.8
%75	57.6	63.3	100.4	75.1
%50	42.4	65.4	65.8	58.3
l.s.d		9.26		
Mean	89.6	91.4	112.0	
l.s.d		16.41		

Root/Shoot ratio

The table (9) shown that which increase of Moisture stress leading to give high ratio of the root/shoot this indicate to stress had effected in two groups the vegetative and roots, but without equilibrium of them, while the reduction of Shoot more them root, because of the shoot are subjected to loss the water of the stomata by sun radiation and wind that caused desiccation more than root case. Where the Vegetates parts would reduction of their growth more the roots (Kremer, 1989). There are not significant with supplied of the yeast and Anti- respiration on root/shoot ratio.

Table 9. Effect of Study Agents inRoot/Shoot ratio

Water Stress	**Control**	**Armourax**	***S. cerevisi*a**	Mean
%100	**0.404**	**0.407**	**0.427**	**0.388**
%75	**0.449**	**0.424**	**0.416**	**0.413**
%50	**0.388**	**0.463**	**0.469**	**0.420**
l.s.d		**0.0537**		
Mean	**0.414**	**0.431**	**0.437**	
l.s.d		**0.0333**		

Relative growth rate

Relative growth rate express about the mass of dry weight that are accumulated to the unit of area at the period of time. Table(10) shown that the Increasing of Moisture stress lead to decrease of relation growth rate under two Levels 75, 50% water Irrigation as 1411, 33.64% respectively. The relative growth rate is decreased of drought due to Inhibition of cell division, reduction of their size as well as less of dry weight (Khalil and Grace, 1992). The result of grow rate resulted to decrease of growth parameters that would contributed of the accumulated of dry matter, leaf area, dry weight leaves, chlorophyll content and their stability (1,2,3,4) respectively. This reflected on dry matter under Moisture treatment stress. The yeast of bread gave percent 29.70% compared to control treatment, because of the yeast have Amino acid, nutrient element and plant hormonal, this is lead to Increase of Relative growth rate.

Table 10. Effect of Study Agents in Relative growth rate

Water Stress	**Control**	**Armourax**	***S. cerevisi*a**	Mean
%100	**16.57**	**14.89**	**18.51**	**17.00**
%75	**11.26**	**12.64**	**17.22**	**14.60**
%50	**9.64**	**9.56**	**12.43**	**11.28**
l.s.d		**3.02**		
Mean	**12.49**	**12.36**	**16.05**	
l.s.d		**1.63**		

References

[1]. Ahmed, E. T., .1998. Influence of concentration and time of spraying active dry yeast on growth and volatile oil content of Marjoram plants. J. Agric. Sci. Mansoura Univ., 23(11):5067-5081.

[2]. Al - Desouki, Hishmat Sulaiman Ahmed.2009. Increased resistance of sorghum plants to water stress by treatment with butane glycerin and chiquimic acid. Third Conference for Marketing Applied Research and University Services, Mansoura University.

[3]. AL-Aulis, Abbas Ajil Mohammed Abbas.2005. Response of strains and hybrids of maize under nitrogen and water insufficiency and adequacy. PhD, Faculty of Agriculture, University of Baghdad.

[4]. AL-Ghanimi, Abd Aoun Hashim Alwan, Abdul Jassim Muheisen Jassem Al-Jubouri and Qaimid Thaaban Yousef.2015. Effect of Proline and Water Stress Interaction on Root Growth of Some Maize Plants. Journal of Karbala Scientific University, Volume 13 Issue (2) Scientific.

[5]. Arhon DI. 1949. Copper enzymes in isolated chloroplasts, polyperoxidase in beta vulgaris. Plant physiology 24: 1-15.

[6]. Aslam, M., M.S.I. Zamir, I. Afzal, M. Yaseen, M. Mubeen, A. Shoaib.2013. Drought stress, its effect on maize production and development of drought tolerance through potassium application. CercetăriAgronomicin Moldova Vol. XLVI, No. 2 (154).

[7]. Attia, Hatem Jabbar and Khudair Abbas Jadou.1999. Organizational Growth and Scientific Growth Organizations. Ministry of Higher Education and Scientific Research, Baghdad - Printing House of Books P 25.

[8]. Bandurska, Hanna and Halina Gniazdowska-Skoczek.1995.Cell Membrane Stability in Two Barley Genotypes under water stress condition. Act societies botanic rum poloniae, Vol.64, No.1.

[9]. Clarke, J.M. and I. Romagosa, 1989. Evaluation of excised-leaf water loss rate for selection of durum wheat for dry environments. Proceedings of the Physiology-Breeding of Winter Cereals for Stressed Mediterranean Environments, July 3-6, 1989, Montpellier, France.

[10]. Deshmukh, P.S., R.K. Sairam, and D.K. Shukla. 1991. Measurement of ion leakage as a screening technique for drought resistance in wheat genotypes. Indian J. Plant Physiol. 34:89–91.

[11]. EL-Sahooki, Medhat Majid. 1990. Maize production and improvement. Ministry of Higher Education and Scientific Research _ University of Baghdad. P. 356.

[12]. El-Tohamy, W.A. and N.H.M. El-Greadly.2007. Physiological Responses, Growth, Yield and Quality of Snap Beans in Response to Foliar Application of Yeast, Vitamin E and Zinc under Sandy Soil Conditions. Australian Journal of Basic and Applied Sciences, 1(3): 294-299.

[13]. Guidelines for cultivation and production of maize.2011. Ministry of Agriculture - General Authority for Extension and Agricultural Cooperation.

[14]. Hegab, M.H.; Ahmed, F.F. and Ali, A.H. 1997. Influence of spraying active dry yeast on growth and productivity of Valencia orange trees (*Citrus sinenesis* L.). First Scientific Conf., Assist, Fac. of Agric. from whole plant to cell. Annals of Botany 103.

[15]. Hillel, D. 1998. Application of Soil Physics. A Cadmic press .Inc. New York. P.116-126.

[16]. Hunt, R. and J. C. Cornelissen. 1997. Components of relative growth rate and their interrelations in 59 temperate plant species. New Phytol. 135: 395-417.

[17]. Khalil, A.A.M, Grace, J. 1992. Acclimation to drought in *Acer pseudoplatanus* L. (Sycamore) Seedling. J. Exp. Bot. 43: 1591-1602.

[18]. Kramer, Paul J. 1989. Water relations of the plant, translated by Dr. Qutaiba Mohamed Hassan. Ministry of Higher Education and Scientific Research, University of Baghdad - House of Wisdom.

[19]. Kramer, Paul J. 1989. Water relations of the plant, translated by Dr. Qutaiba Mohamed Hassan. Ministry of Higher Education and Scientific Research, University of Baghdad - House of Wisdom.
[20]. Mohamed, Abdel AzimKazem and Moayad Ahmed Al Yuns 1991. The basics of plant physiology (Part 3). Ministry of Higher Education and Scientific Research - University of Baghdad, p1299 P3.
[21]. Oppenheimer, H. R. 1960. Adaptation to drought, xerophytes. Pages 105-38 in arid zone research. XV. Plant water relationships in arid and semi-arid conditions. Reviews of Research. UNESCO, Paris.
[22]. Sayar, R., H. Khemira, A. Kameli and M. Mosbahi.2008. Physiological tests as predictive appreciation for drought tolerance in durum wheat (*Tritium durum* Desf.) .Agronomy Research Vol. 6 No (1).
[23]. Valentovič, P. M. Luxová, L. Kolarovič, O. Gašparíková.2006. Effect of osmotic stress on compatible solutes content, membrane stability and water relations in two maize cultivars. PLANT SOIL ENVIRONS. *52* (4): 186–191.
[24]. Zhang, H., Pala, M., Owes, T. and Harris, H. 2000. Water use and water-use Efficiency of chickpea and lentil in a Mediterranean environment. Australian Journal of Agricultural Research 51, 295–304.
[25]. Zoghmar, Meriem and Kara Youcef. 2014. Morpho-Physiological Behavior of Four Genotypes of Durum Wheat (*Tritium durum* Desf.) Grown under Different Levels of Water Stress. American-Eurasian J. Agric. & Environ. Sci., 14 (11): 1213-1220.

Basheer AbdalaAbraheem "Role of Bread Yeast and Anti-transpiration in some Indicators of Vegetative Growth of Maize under Water Stress." IOSR Journal of Agriculture and Veterinary Science (IOSR-JAVS) 10.12 (2017): 51-56.