Review Journal of Social Psychology & Social Works

http://socialworksreview.com

ISSN-E: 3006-4724 Volume: 3
ISSN-P: 3006-4716 Issue: 4 (January - February, 2025)

Ameliorative Role of Moringa Leaf Extract Against Disease, Salinity, and Terminal Drought Stress of SugarCane

Taj Muhammad[a], Abdul Mannan[b] Abdul Hanan[c], Fida Husain[d], Tauqeer Qadir[e] , Rahat Batool [f] Hafiz Abdul Rauf[g] Mumtaz Ahmad[h],Muhammad Abubakar Mazari[i], , Zain Ul Islam[j],

[a,e]**Sugarcane Research Station khan pur.**
[b,j]Institute of Agronomy Bahauddin Zakariya University Multan.
[c]Bahauddin Zakariya University Multan Department of Plant Breeding and Genetics, Bahauddin Zakariya University Multan.
[d]Agronomic Research Station Bahawalpur
[f]Scientific Officer (Food Technology) Mango Research Institute Multan Pakistan.
[g] Senior Scientist Agronomy Cotton Research Institute Khan Pur Pakistan.
[hi]Department of Agriculture Engineering Khawaja Fared University of Engineering and Information Technology Rahim Yar Khan Pakistan

DOI: https://doi.org/10.71145/rjsp.v3i4.499

Abstract:
Innate plant growth bio stimulant is energetically used in the crop growth standard and unfavourable situation. Extremely badly pompous by salt and water stress level, sugar cane is main crop that mostly tabulate commercially successful in the world. The experiment was done in Bahauddin Zakariya University Multan. Experiment was consist of RCBD and treatments were **Io control, I1=sugar cane setts treated with hydro priming- moringa, I2= skip irrigation irriga tion, Factor: b** T_1= UREA 5KG+Moringa leaf extracts spray(1:20)**,** T2 = SOP 5KG+Mornga spray(1:30), T3= UREA+ SOP +Moringa spray (1:40). The main purpose of this experiment is to appraise either leave extract of (Moringa Oleifera) such a natural bond bio stimulant for crop development could play an important role in water stress resistivity in cash crop over containing salt situation. In hot season foliar application is to irrigate the cop and save the water. The impact of growth, production and water use efficiency, physio bio chemical, allocate and leaves perusal crush reveal to water stress level. The moringa extracted crop to determine better development and production, , water use efficiency, Utilization of moringa extract is very important to aggravate reduce water scarcity in cash crop to perpetuated more RWC, WUE and soma regulation and less EL.

Keywords: Drought Stress, salt tolerance, bio stimulant Moringa.

Introduction

Sugar cane crop is basic source to produce white sugar in the world (Arif et al., 2019).sugar cane approximately 14.2 million ha with commercial world produce 1374.9 million ton ha every years or 60.5 million ton annually. (FAOSTAT, 2019).Sugar cane start cultivated to be commercially in china and India about 2500 years ago and 18th century spread to western Europe (Leal, 2007, Kaur, 2014). Today sugar cane is used in much purpose such as fuel production, chemical, bio fertilizer, paper and pulp. Sugar cane contributes about 70% of sugar

produce in worldwide and very important in Agricultural sector industries (Arruda, 2011, Aguilar-Rivera, 2019). Sugarcane is the 2nd biggest crop of Pakistan and covers 0.966 million hectares providing about 3.6 percent of gross domestic production (GDP). Recently sugarcane crop cultivated area about 4.8 percent and 11 percent share to the total crops (Srikanth *et al.*, 2022). Drought, being the most important environmental stress, effecting growth, limits plant production and the performance of crop plants, more than any other environmental factors (Shao et al., 2009). Moringa oleifera or drumstick tree is a tropical plant widely known to be of the greatest medicinal values (Fahey, 2005; Paliwal et al., 2011). It is a plant native to Pakistan, India, Bangladesh and Afghanistan and grows up to 5 or 10 meters in height. It is popularly called „the miracle tree" with potentials for the treatment of various diseases like cancer, diabetes mellitus and hypertension (Fahey 2005); Paliwal et al (2011)). Moringa leaves have been reported to be a rich source of -carotene, vitamin C, protein, calcium and potassium and act as a very good source of natural antioxidants; and thus enhance the shelf-life of fat containing foods because of the presence of various types of antioxidant compounds such as ascorbic acid, flavonoids, carotenoids and phenolics (Dillard and German, 2000; Siddhuraju and Becker, 2003). In the Philippines, it is known as „mother's best friend" because of its utilization to increase woman's milk production and sometimes protect from anaemia (Estrella et al., 2000; Siddhuraju and Becker, 2003). Ascorbic acid is an antioxidant molecule that works as a primary substrate in the cyclical pathway for neutralization detoxification and detoxification of superoxide radicals and singlet oxygen radical. (Noctor and Foyer, 1998). Sugar cane is a fundamental source to create white sugar in all over the world (Arif et al., 2019).Sugar cane about 14.2 million ha in the world make 1374.9 million ton ha every years or 60.5 million ton annually (FAOSTAT, 2019).Suitable temperature for sugar cane initiation is 32-38^{o}C. For excellent growth temperature need 22-30^{o}c.Normal temperature for outstanding development required 20^{o}c. Sugar cane enrich in vitamins, carbohydrate and amino acid as well as used in fruitful juice. Approximately 493 megagram (Mg; metric ton) of bagases through 1600 Mg of sugar cane have been get from sugar cane industry (Khattab et al., 2019). Sugar cane start cultivated to be commercially in china and India about 2500 years ago and 18th century spread to western Europe (Leal, 2007, Kaur, 2014). Recently sugar cane used in many purpose that is fire production. Organic and inorganic nutrents,paper and pulp. Sugar cane share 70% of sugar made in the world and crucial in agriculture department's factory. (Arruda, 2011, Aguilar-Rivera, 2019). Moringa leaves is an organic nutrients and well known as medicinal plants as well as fertilizer usage , has bioactive elements occurs in the leaf which enhance crop growth without any side effect on crop as well as on climate (Uddin et al., 2021).Moringa leave contribute less expenses is an alternative source of natural fertilizer which corroborate excellent functioning when enhance crop yield and this launch regulate natural nutrients as well as sustainable farming (Bañon et al., 2006).

Organic Fertilizers play an invaluable role in supporting sustainable agriculture, offering multiple advantages for soil health, environmental sustainability and long-term agricultural output (Assaha et al., 2016). Bio fertilizer plays a peripheral part in agriculture farming, recycling of fertilizer, increase soil health. Plant separation consist of bioactive chemical with physiological impact on the plant development, that is phytohormones,antioxidants, phenolic compounds, flavonoids, terpenoids, alkaloids or others (Abd El-Mageed et al., 2017). Moringa leaves separation is an organic nutrients directly impact on the inorganic fertilizer due to attribute for increase the development and production (Rady et al. 2015). MLE include many contribute crucial crop nutrition involve nitrogen (N), phosphorus (P), potassium (K), calcium (Ca), and magnesium (Mg). These nutrients clearly absorb by crop for maturation, enlargement, fertility (Bañon et al., 2006). MLE supply crop protection as well as yield ammunition chemical

to build up the crop resistance alongside naturalistic and human produced harm that is insect and disease.MLE contain bio active chemical which restorative producing natural resistance compound such as phenolic compound and flavoniods that act as natural resistance compound disinclined pest and disease additionally support defence system that is enhance resistance pathways and enhance strongest against stress which is environmental stress (Younas et al., 2023). MLE has been highly observed over many crop as bio fertilizer to encounter water shortage complicated resistance, indicate its suggest as biological control to reduce shortage problems (Uddin et al, 2021). Moringa play important role in crop development and large amount of protein to make up protoplasm. Therefore Crucial nutrients such as potassium, calcium, magnesium As well as natural antioxidant compounds such as ascorbic acid flavonoids phenolics and carotenoids give additionally to increase the viability in development (Singh et al., 2023).

Material Method and preparation of MLE

Currently the application of moringa plant parts especially leaves in different part as diet, medicine, as well as apply growth stimulant in plant development. Rate and best application time MLE with importance research [Foidl 2011, Iqbal et al 2019 ,Ngcobo et al 2021]. The reaction of crop is peculiar with type of MLE take out, the leaf extraction solution used and rate of extract nasir et al 2020, Iqbal et al 2020, 2021,Phiri and Mbewe 2010,Khan R.U 2021]. It is very significance observation that extraction method and solvents to indicate extraction process. It is, therefore, important to review the extraction methods and solvents used to determine how varying the extraction process can result in the leaf extract containing high or low concentrations of 'active ingredients' (biological compounds) that can enhance either nutraceutical or agricultural food production.

Preparation of Aqueous solution

Berkovich et al 2013 Take out phytochemical material and nutrients from dry leaves of Moringa tree cultivated in tropical and subtropical in fertile soil. The extract liquid Moringa was make ready by mixing 1 g of dry leaves powder with 10 ml distil water for five minute before sieve it two times throughout 2 um sterile filter paper into sterile tube. The extract liquid solution 100 mg/ml newly take out for every experiment and not keep them more than five days at 4^0c Berkovich L et al 2013. In place of dry leaves powder, make liquid extract of Moringa at 1:10 w/v ratio and mixed 30 g of fresh leaf with 300 ml of water in a home blender for fifteen minute. Therefore sieve get solution through muslin cloth and mixed it with distil water at different ratios (1:20,1:30.1:40) rapid as soon as possible apply to the crops. So water is a good solvent does not effect on the more yield, normally the liquid extraction of Moringa obtain more popularity in current years amongst growers, specifically the small growers, that why easily more available water, low cost, eco-friendly as compared to other methanol and alcohol [Yasmeen A et al.,2013 ,Brockman H.G and Brennan 2017 ,Bozinou et al2017,Abel S. et 2021al].

Results and Discussion:

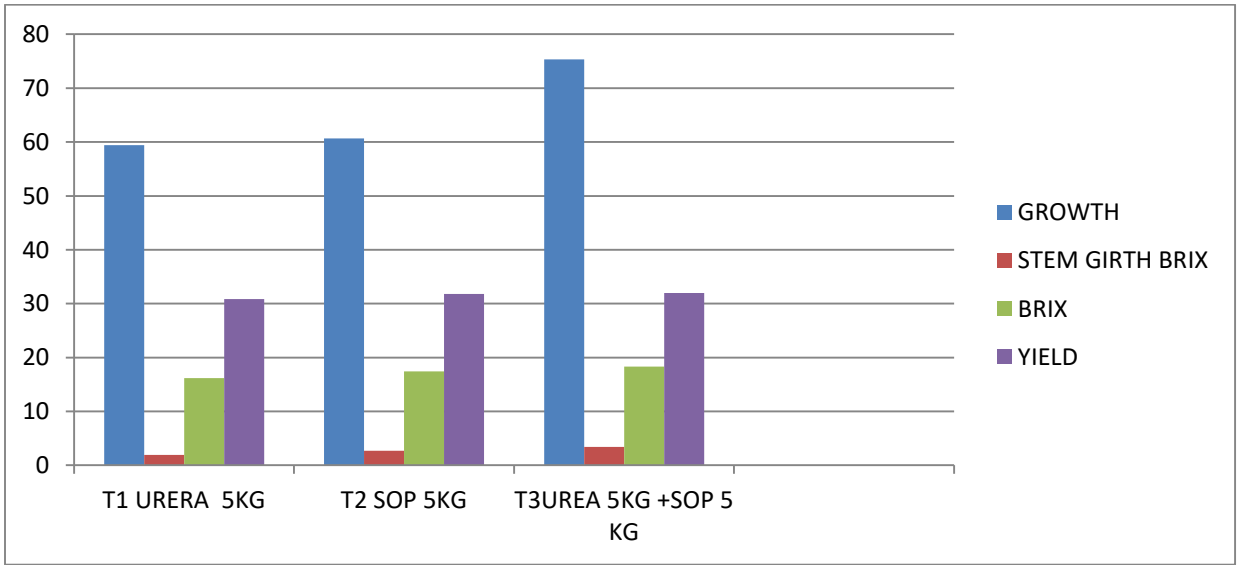
Moringa play an important role in crop development and large amount of protein to make up protoplasm. Therefore Crucial nutrients such as potassium, calcium, magnesium As well as natural antioxidant compounds such as ascorbic acid flavonoids phenolics and carotenoids give additionally to increase the viability in development (Singh et al., 2023). The experiment was done in Baahauden Zakarya University Multan. Experiment was consist of RCBD .There is in the treatment T3 75.35 maximum growth,stem girth, brix , was noted and in the treatment T1 59.44 minimum growth stem girth,brix was seen , (Abdalla 2015.Bulgari 2019),as like that

attempts to reduce inorganic fertilizer and enhance fertilizer efficacy as well as mitigate different biotic and abiotic stress on crop by use of crop bio stimulant have been achieve as shown in table. Jardin 2015 describes that Crop Bio stimulant consist many bio active mixture which increase multiple physiological process, so enhance crop development as well as production can be seen in fig. (FAO, 2014; Radovich, 2009; Orwa et al., 2009; Bosch, 2004), observe that Moringa (*Moringa oleifera* Lam.) is a multipurpose tropical tree. It is mainly used for food and has numerous industrial, medicinal and agricultural uses, including animal feeding. Nutritious, fast-growing and drought-tolerant, this traditional plant was rediscovered in the 1990s and its cultivation has since become increasingly popular in Asia and Africa, where it is among the most economically valuable crops. It has been dub bed the "miracle tree" or "tree of life" by the media as shown in fig.

TABLE: MORINGA LEAF EXTRACT SPRAY EFFECT AND SUSTAIABBLE BIOLOGICAL CONTROL AGAINST TERMINAL DROUGHT STRESS IN SUGAR CANE.

	Growth	Stem girth	Brix	**Yield**
T1 =UREA	59.44	1.9	16.27	30.87
T2=SOP	60.66	2.7	17.49	31.82
T3=UREA +SOP	75.35	3.4	18.36	31.97

FIG: **MORINGA LEAF EXTRACT SPRAY EFFECT AND SUSTAIABBLE BIOLOGICAL CONTROL AGAINST TERMINAL DROUGHT STRESS IN SUGAR CANE**



Similarly in the treatment T3 yield was more and in the T1 treatment yield was minimum (Foidl et al., 2001),describe that Phytohormones extracted from Moringa leaves have been shown to have a growth enhancing effect on various plants, including black gram, peanut, soybean, sugarcane and coffee.Spraying Moringa leaf extract on leaves increased plant production by 20-35% as shown in fig.

Conclusions

Results show that use of MLE was efficient in diminution physiological reaction of drought destruction (stress and salinity) and good results of MLE usage were highly recommended under water shortage, salinity and salty soil. water is a good solvent does not effect on the more yield, normally the liquid extraction of Moringa obtain more popularity in current years amongst growers, specifically the small growers, that why easily more available water, low cost, eco-friendly as compared to other methanol and alcohol

Reference

Abd El-Mageed T.A., Semida W.M., Rady M.M. Moringa leaf extract as biostimulant improves water use efficiency, physio-biochemical attributes of squash plants under deficit irrigation. Agric. Water Manag. 2017;193:46–54.

Abdalla M.M. Boosting the growth of rocket plants in response to the application of Moringa oleifera extracts as a biostimulant. Life Sci. J. 2014; 11:1113–1121.

Abel S., Tesfaye J.L., Nagaprasad N., Shanmugam R., Dwarampudi L.P., Krishnaraj R. Synthesis and characterization of zinc oxide nanoparticles using moringa leaf extract. J. Nanomater. 2021;2021: 4525770. doi: 10.1155/2021/4525770.

abiotic stress conditions. Agronomy. 2019;9:306. doi: 10.3390/agronomy9060306.

Ali E.F., Hassan F.A.S., Elgimabi M. Improving the growth, yield and volatile oil content of Pelargonium graveolens L. Herit by foliar application with moringa leaf extract through motivating physiological and biochemical parameters. S. Afr. J. Bot. 2018;119:383–389.

Ali, M., Abbas, A., Awan, S., Jabran, K., Gardezi, S., 2011. Correlated response of various morpho-physiological characters with grain yield in sorghum landraces at different growth phases. Journal of Animal and Plant Sciences 21, 671-679.

Ali, S. A. M.; Abdalla, H. O. ; Elameen, M. D., 2011. Effect of dietary supplementation of *Citrullus colocynthis* seeds on performance and carcass yield of broiler chickens. U. of K. J. Agric. Sci. 19(3), 387-398

Alkuwayti M.A., El-Sherif F., Yapa Y.K., Khattab S. Foliar application of Moringa oleifera leaves extract altered stress-responsive gene expression and enhanced bioactive compounds composition in Ocimum basilicum. S. Afr. J. Bot. 2020;129:291–298.

and cadmium in bean (Phaseolus vulgaris L.) plants. Ecotoxicol. Environ. Saf. 2014;

and industrial uses. In: What development potential for Moringa products? October 20th -

AP Arruda, M Milanski, LA Velloso Hypothalamic inflammation and thermogenesis: the brown adipose tissue connection Journal of bioenergetics and biomembranes 43 (1), 53-58.

Assaha, D.V.M., Liu, L., Ueda, A., Nagaoka, T., Saneoka, H., 2016. Triveni enterprises. Journal of Environmental Biology 37, 107-114.

Bañon, S., Ochoa, J., Franco, J., Alarcón, J., Sánchez-Blanco, M.J., 2006. Hardening of oleander seedlings by deficit irrigation and low air humidity. Environmental and Experimental Botany 56, 36-43.

Berkovich L., Earon G., Ron I., Rimmon A., Vexler A., Lev-Ari S. Moringa oleifera aqueous leaf extract down-regulates nuclear factor-kappaB and increases cytotoxic effect of

chemotherapy in pancreatic cancer cells. BMC Complement. Altern. Med. 2013; 13:212. doi: 10.1186/1472-6882-13-212.

Bozinou E., Karageorgou I., Batra G., Dourtoglou G.V., Lalas I.S. Pulsed electric field extraction and antioxidant activity determination of Moringa oleifera dry leaves: A comparative study with other extraction techniques. Beverages. 2019;5: 8. doi: 10.3390/beverages5010008.

Brockman H.G., Brennan R.F. The effect of foliar application of moringa leaf extract on biomass, grain yield of wheat and applied nutrient efficiency. J. Plant Nutr. 2017; 40:2728–2736. doi: 10.1080/01904167.2017.1381723.

Bulgari R., Cocetta G., Trivellini A., Vernieri P., Ferrante A. Biostimulants and crop responses:

Bulgari R., Franzoni G., Ferrante A. Biostimulants application in horticultural crops under

Dekoum Vincent Marius Assaha, Liyun Liu,Akihiro Ueda, Toshinori Nagaoka and Hirofumi Saneoka 2016. Effects of drought stress on growth, solute accumulation and membrane stability of leafy vegetable, huckleberry (Solanum scabrum Mill.) Journal of Environmental Biology,Volume 37 Number 1 Page No: 107-114.

EBIC (European Biostimulants Industry Council) EBIC and Biostimulants in Brief. 2012. Available online: http://www.biostimulants.eu/

Fahey, J.W. (2005) Moringa oleifera: A Review of the Medical Evidence for Its Nutritional, Therapeutic, and Prophylactic Properties. Part 1. Trees for Life Journal, December, 1(5).

Foidl, N.; Makkar, H. P. S.; Becker, K., 2001. The potential of *Moringa oleifera* for agricultural

Foods and Drugs Administration of United States of America – FDA (2014). Government Printing Office. Retrieved from S. Arif, A. Batool, W. Nazir, R.S. Kha, N. Khalid (2019). Physiochemical characteristics nutritional properties and health benefits of sugarcane juice Non-Alcoholic Beverages, 6, pp. 227-257.

Hong-Bo Shao [1], Li-Ye Chu, C Abdul Jaleel, P Manivannan, R Panneerselvam, Ming-An Shao 2009 Understanding water deficit stress-induced changes in the basic biotechnologically and sustainably improving agriculture and the ecoenvironment in arid regions of the globe.

Howladar S.M. A novel Moringa oleifera leaf extract can mitigate the stress effects of salinity

Jardin P.D. Plant bio stimulants: Definition, concept, main categories and regulation. Sci. Hortic. 2015;196:3–14. doi: 10.1016/j.scienta.2015.09.021.

Jhilik N.Z., Hoque T.S., Moslehuddin A.Z.M., Abedin M.A. Effect of foliar application of moringa leaf extract on growth and yield of late sown wheat. Asian J. Med. Biol. Res. 2017;3:323–329.

Khalofah A., Bokhari N.A., Migdadi H.M., Alwahibi M.S. Antioxidant responses and the role of Moringa oleifera leaf extract for mitigation of cadmium stressed Lepidium sativum L. S. Afr. J. Bot. 2020;129:341–346.

M. Leal (2007), The potential of sugarcane as an energy source Proceedings of Proceedings of

Mashamaite C.V., Dube Z.P., Phiri E.E. Chemical root-pruning of Moringa oleifera for improved seedling growth. S. Afr. J. Bot. 2020;129:155–160. doi: 10.1016/j.sajb.2019.04.003.

Mohite B. Isolation and characterization of indole acetic acid (IAA) producing bacteria from rhizosphere soil and its effect on plant growth. J. Soil Sci. Plant Nutr. 2013;13:638–649.

N Aguilar-Rivera 2019 A framework for the analysis of socioeconomic and geographic sugarcane agro industry sustainability Socio-Economic Planning Sciences 66, 149-160.

November 2nd 2001. Dar Es Salaam

Popa V.I., Dumitru M., Volf I., Anghel N. Lignin and polyphenols as allelochemicals. Ind. Crops Prod. 2008;27:144–149. doi: 10.1016/j.indcrop.2007.07.019

Radovich, T., 2013. Farm and forestry production and marketing profile for Moringa. In: Elevitch, C.R. (Ed.) Specialty Crops for Pacific Island Agroforestry. Permanent Agriculture Resources (PAR), Holualoa, Hawai

S. Bañon , J. Ochoa , J.A. Franco , J.J. Alarcón , M.J. Sánchez-Blanco 2006.Hardening of oleander seedlings by deficit irrigation and low air humidity. *Environmental and Experimental Botany* Volume 56, Issue 1, May 2006, Pages 36-43.

Sadat M.R. Khattab, Takashi Watanabe (2019), Bioethanol Production from Food Crops, Elsevier pp. 187-212.

Sadat M.R. Khattab [*] [**], Takashi Watanabe 2019 Bioethanol From Sugarcane Bagasse: Status and Perspectives Sustainable Sources, Interventions, and Challenges 2019, Pages 187-212.

Singh, P., Saini, N., Bhola, L., Mishra, P., Aamir, M., 2023. Crosstalk of biostimulants with other signaling molecules under metal stress, Biostimulants in Alleviation of Metal Toxicity in Plants. Elsevier, pp. 469-509.

Srikanth, J., Geetha, N., Punithavalli, M., Mahesh, P., Saravanan, L., Singaravelu, B., ... & Yogambal, C. (2022). A reappraisal of internode borer (Chilo sacchariphagus indicus) impact on sugarcane. Journal of Sugarcane Research, 12(1), 92-102.

Stafa M. Rady1 , Gamal F. Mohamed1 , A.M. Abdalla2 , Yasmin H.M. 2015 .Integrated application of salicylic acid and Moringa oleifera leaf extract alleviates the salt-induced adverse effects in common bean plants. Journal of Agricultural Technology 2015 Vol. 11(7):1595-1614.

Uddin, S., Ullah, S., Nafees, M., 2021. Effect of seed priming on growth and performance of Vigna radiata L. under induced drought stress. Journal of Agriculture and Food Research 4, 100140.

Yasmeen A., Basra S.M.A., Farooq M., Rehman H., Hussain N., Athar H.R. Exogenous application of moringa leaf extract modulates the antioxidant enzyme system to improve wheat performance under saline conditions. Plant Growth Regul. 2013;69:225–233.

Younas, M., Rasool, M.H., Khurshid, M., Khan, A., Nawaz, M.Z., Ahmad, I., Lakhan, M.N., 2023. Moringa oleifera leaf extract mediated green synthesis of silver nanoparticles and their antibacterial effect against selected gram-negative strains. Biochemical Systematics and Ecology 107, 104605.