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Effect of Biofertilizer changes on DPPH radical scavenging activity of Maize (*Zea mays* L.) Variety Eco-92

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ABSTRACT

The objectives of this research were to evaluate the performance of 1, 1-diphenyl-2-picrylhydrazyl radical scavenging activity (DPPH) at immaturity and physiological maturity stages, to study the correlation studied antioxidant activities. The effect of different biofertilizers such as *Azotobacter* and Phosphate Solubilizing Bacteria (PSB) on 1,1-diphenyl-2-picrylhydrazyl radical scavenging activity in the Maize (*Zea mays* L.) variety Eco-92. Maize cob harvested at dry kernel stage was significant and slightly higher than cob harvest at fresh kernel stage. It revels from the figure, significantly different at ($p \leq 0.05$) higher in application of biofertilizers treatments. However, treatment with combined application of *Azotobacter* + PSB biofertilizer (A+P) biofertilizers had the highest 1,1-diphenyl-2-picrylhydrazyl radical scavenging activity (DPPH) as compaired to control. Overall, *Azotobacter* and PSB biofertilizers improved the quality and Antioxidant activity to a stronger scavenging potential.

Keywords: *Azotobacter,* PSB, Eco -92, DPPH etc.

INTRODUCTION

Maize (Zea mays L.) being an important staple food crop after Rice and Wheat throughout the world (FAO, 2002), Maize originated from Mexico. Every part of the maize plant has economic value and cob can all be used to produce a large variety of food and non-food production (IITA 2006). It has a wide variety of uses including use as a raw material for edible and processed food, in animal feed, and in industrial applications. In many countries, maize grains are transformed into various products. They can be roasted, boiled, fried, or ground and fermented to produce bakery products or alcoholic beverages (Rooney and Serna-Saldivar, 2003). Maize grain is well-off in molecules with antioxidant characteristics, such as phenol compounds, carotenoids, anthocyanins, and flavonoids (Nuss et al. 2010). Capturing the value from co-products of grain or ear production is economically beneficial.

Low importance organs such as husks, cobs and tassels can be an inexpensive feedstock for the extraction of valuable chemicals. These constituents are regarded as an important source of antioxidants in cereals and survive in free as well as bound (Montilla et al., 2011). The similar results are concurved in case of barley. The productivity of maize is dependent on its nutrient requirement and management particularly that of nitrogen, phosphorus and potassium (Arunkumar, 2007). Corn showed the potential of health benefits for its antioxidant activities (Adom and Liu, 2002). Many studies have measured the content of antioxidant compounds and antioxidant activity in maize grains (Tafuri et al. 2014). The maize used for human food and animal fodder. Selected and applied methods of biofertilizer increasing integration in production and also coexist environment free from pollution. Therefore, the purpose of this study was to evaluate the effects of biofertilizers on radical scavenging activity of maize, so that it may be used as a resource for nutraceutical products or the food industry in the future.

MATERIAL METHODS

Experimental site:
The field experiment was conducted at the Experimental farm Belanki (Santoshwadi Lat. $16^0 50' 42''$N, Long. $74^0 51' 54''$ E), Dist. Sangli.

Treatments:
Azotobacter biofertilizer considered as 'A'. PSB biofertilizer considered as 'P' and collective application was considered as 'A+P' arranged respectively as in the form. Characters using a split plot based on a randomized complete block design with three replications.

Fertilizer applications:
The treatment of bio-fertilizer levels were corresponding to (TA_1), (TA_2), (TA_3), (TP_1), (TP_2), (TP_3) and ($TA+TP_1$), ($TA+TP_2$), ($TA+TP_3$) respectively.

Free radical scavenging activity determination (DPPH) activity:
The stable 1, 1-diphenyl-2-picryl hydrazyl radical (DPPH) was used for determination of free radical-scavenging activity of the extracts (Koleva et al.,2002). 150 µl of each fresh and dry extract separately were added, at an equal volume, to methanolic solution of DPPH (100 µM). After 15 min at room temperature, the absorbance was recorded at 517 nm. The experiment was repeated for three times. BHT and Ascorbic acid were used as standard controls. The percentage of DPPH discoloration of the sample was calculated according to the equation: % discoloration = (1-Abs sample /Abs control) × 100. The Ascorbic acid and BHT were used for the positive control in the aqueous extract and ethanolic extracts respectively.

Statistical analysis:
The collected data was statistically analyzed separately according to the analysis of variance (ANOVA) by and Duncan's Multiple Range Test (DMRT) used to determine the level of significance at $p \leq 0.05$ with SPSS excels software.

RESULTS & DISCUSSION

1, 1-diphenyl-2-picrylhydrazyl (DPPH) activity: 1.1-diphenyl-2-picrylhydrazyl (DPPH) values ranged from 25.3 to 15.0 (%) reductions for fresh kernel stage and 34.9 to 23.6 (%) reductions for dry kernel stage in Eco-92.

Table 1: Effect of Biofertilizers on DPPH (%) reduction content of Maize (*Zea mays* L.) Variety Eco-92

Eco.92 Treatments	DPPH (%) reduction	
	Fresh	Dry
Control	15.0e	13.9e
(TA_1)	17.5d	17.2c
(TA_2)	17.6d	17.4c
(TA_3)	17.1d	25.8a
(TP_1)	19.6c	21.6c
(TP_2)	19.0c	21.2c
(TP_3)	19.1c	21.9c
($TA+TP_1$)	25.4a	23.9b
($TA+TP_2$)	24.1b	22.8b
($TA+TP_3$)	25.3a	23.6b
Mean	19.87	23.03
LSD 0.05	5.0	17.6

Different letters (a-e) followed values in same column indicate significant difference in Means of at ($p \leq 0.05$)

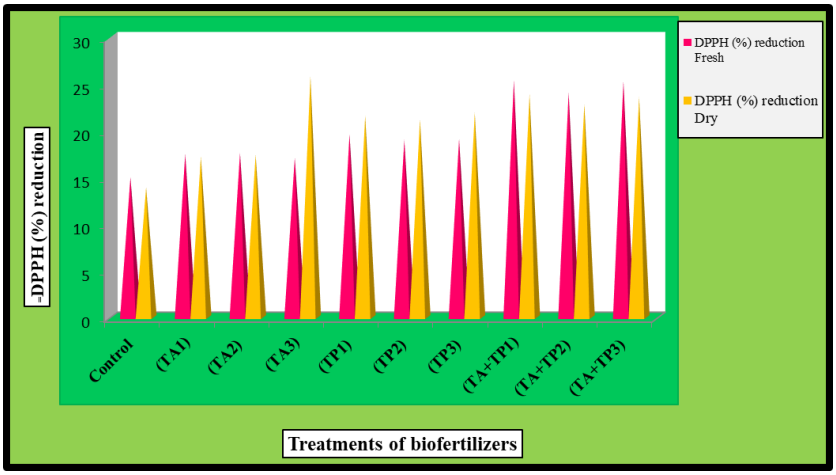

Figure 43: Effect of Biofertilizers on DPPH (%) reduction content of Maize (*Zea mays* L.) Variety Eco-92

Scavenging activity of free radicals 1.1-diphenyl-2-picrylhydrazyl (DPPH) has been widely used to evaluate the antioxidant activity of natural products from plant and microbial sources (Shyura et al., 2005). For fresh kernel stage, in Eco-92 yellow kernel color and highest 25.4,25.3,24.1 (%) reduction followed by combine treatment of biofertilizers Azotobacter and Phosphate solubilsing Bacteria (TA+TP1), (TA+TP3), (TA+TP2). At dry kernel stage, in Eco-92 white kernel color yellow and highest 1.1-diphenyl-2-picrylhydrazyl (DPPH) values 25.8,23.9,23.6 (%) reduction followed by combine treatment of biofertilizers Azotobacter and Phosphate solubilsing Bacteria (TA3), (TA+TP1), (TA+TP3). It is noticed from the figure that, lowest 1.1-diphenyl-2-picrylhydrazyl (DPPH) values in control as compared to the biofertilizers treatment.

CONCLUSION

It is concluded that, the treatment of biofertilizer increase the (DPPH) activity more effectively than the control positively. The use of biofertilizer influenced the Maize variety Eco-921,1-diphenyl-2-picrylhydrazyl (DPPH) activity of maize seeds in both fresh and dry kernel stage studied in the variety of maize Eco-92 In the variety Eco-92 shows the healthy results in the combine treatment of biofertilizers Azotobacter and Phosphate Solubilizing Bacteria (PSB) TA+ TP3,TA+ TP2 and TA+ TP1 as compare to the Phosphate Solubilizing Bacteria (PSB) treatments TP1,TP3 ,TP2 and reduced result in the treatments of Azotobacter (TA3,TA2 and TA1) as compared to the control maize plants. The above observations show maximum 1, 1-diphenyl-2-picrylhydrazyl (DPPH) activity observed in the combine treatment of biofertilizers in the variety Eco-92.

Biofertilizer as a source in agricultural production, decreases environmental pollution and leads to economic savings for farmers

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