Effct of Foliar Spraying of Dry Yeast as an Organic Growth Stimulant for Lettuce

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INTRODUCTION

Dry yeast (*Saccharomyces cerevisiae*) is a plant growth promoter and a bio control agent for different crops. Yeast can produce hormones, sugars, vitamins, minerals and amino acids that exert active stimulating effect on plant growth. Furthermore, it can induce thermo tolerance in plants by the synthesis of proteins and nucleic acids and minimizing their degradation (Natio *et al,* 1981). The ability of foliar application of yeast in promoting growth and yield and enhancing the quality of some vegetable crops, such as tomato and cucumber plant has been witnessed (Abdel Aziz, 1997; Fathy and Farid 2000; Mona *et al.,* 2005). This study was carried out to study the effect of dry yeast as a foliar spray on the growth, yield and quality of lettuce plant. Lettuce (*Lactca sativa* L), an annual plant of Asteraceae family, is one of the most important leafy vegetables and world's most used salad crop.

MATERIALS AND METHODS

The present investigation was carried out during three successive seasons; *Maha* 2015/2016, *Yala* 2016 and *Maha* 2016/2017 at Regional Agriculture Research and Development Centre, Bandarawela. The experiment was conducted in a poly tunnel as a pot experiment and 30 days old seedlings of leafy lettuce cv. Grand Rapid were used. Soil and compost at 2:1 ratio were used as growing media in 12 inches width plastic growing pots. Plants were sprayed with dry yeast at different concentration at two weeks interval. Complete Randomized Design was laid for the study with six treatment (T1-2g/l, T2-3g/l, T3-4g/l, T4-5g/l, T5-6g/l and T6- water (control)) and ten replicates. Harvesting was carried out at 25 to 30 days after transplanting and growth and yield parameters were recorded.

RESULTS AND DISCUSSION

Table 1 shows the changes in leaf numbers and canopy diameters of lettuce plant due to foliar spraying of dry yeast. They clearly indicate that use of dry yeast as

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a foliar spray on leafy lettuce plants increased vegetative growth. Plants spread with 5g/l and 6g/l concentration of dry yeast produced significantly higher number of leaves as compared to plants subjected to control treatment in all three successful seasons. Furthermore, canopy diameters of lettuce plants subjected to folia application of dry yeast are significantly higher than the canopy diameter of control plants. However, this difference was not observed in *yala* 2016 season. These results could be attributed to the effect of yeast extract in increasing levels of endogenous hormones in treated plants which could lead to cell division and cell elongation (Khedr and Farid 2002). The physiological roles of vitamins and amino acids in the yeast extract which can increase the metabolic processes and levels of endogenous hormones, i.e. IAA and GA_3 also may have contributed to this growth difference (Chailakhyan, 1957).

Table 1. The effect of foliar spraying of dry yeast on leaf number and canopy diameter of lettuce plant

Treatments	Number of leaves			Canopy diameter (cm)		
Dry yeast (g/l)	*Maha* 2015/16	*Yala* 2016	*Maha* 2016/17	*Maha* 2015/16	*Yala* 2016	*Maha* 2016/17
2	10.6^{c}	12.8^{ab}	20.9^{b}	32.8^{ab}	37.7^{a}	18.2^{b}
3	12.2^{cb}	12.6^{ab}	20.8^{b}	33.0^{a}	36.8^{a}	18.5^{b}
4	14.0^{b}	14.0^{a}	21.3^{ab}	32.0^{ab}	36.2^{a}	19.2^{ab}
5	18.6^{a}	14.0^{a}	21.5^{ab}	34.6^{a}	37.7^{a}	19.2^{ab}
6	18.0^{a}	14.7^{a}	22.0^{a}	33.4^{a}	37.4^{a}	20.0^{a}
Control	12.6^{cb}	11.8^{b}	20.8^{b}	29.2^{b}	33.3^{a}	18.5^{b}
Cv%	13.54	11.43	7.27	8.69	8.57	5.95
LSD	2.53	2.15	1.49	3.69	4.12	1.07

Note: Means followed by the same letter indicates that the differences between means are not statically significant at 0.05 significance level.

As the data in Table 2 indicates, the highest leaf length was recorded for the plants treated with 6 g/l concentration of dry yeast and the lowest leaf length was observed for control plants. These differences were observed in Maha seasons of both years, but not in *Yala* 2016. The highest leaf width was observed for the plants which are treated with dry yeast at a rate of 6g/l and 5 g/l in *Maha* 2015/16 season.

Table 2. The effect of foliar spraying of dry yeast on leaf characters of lettuce plant

Treatments	Length of leaf (cm)			Width of leaf (cm)		
Dry yeast (g/l)	*Maha* 2015/16	*Yala* 2016	*Maha* 2016/17	*Maha* 2015/16	*Yala* 2016	*Maha* 2016/17
2	20.2^{ab}	25.0^{a}	23.2^{b}	16.4^{b}	15.8^{b}	21.27^{b}
3	21.3^{ab}	23.1^{a}	23.3^{b}	16.5^{b}	16.7^{ab}	21.3^{b}
4	20.0^{ab}	22.6^{a}	23.1^{b}	18.1^{ab}	18.47^{a}	23.31^{a}
5	21.6^{ab}	23.2^{a}	24.1^{ab}	19.8^{a}	17.1^{ab}	22.2^{ab}
6	22.2^{a}	23.9^{a}	25.1^{a}	19.2^{a}	17.3^{ab}	23.1^{a}
Control	19.9^{b}	22.9^{a}	22.7^{b}	16.1^{b}	15.9^{b}	21.0^{b}
CV%	8.28	12.05	7.45	10.78	11.45	7.98
LSD	2.25	3.69	1.63	2.49	2.57	1.57

Note: Means followed by the same letter indicates that the difference between means are not statically significant at 0.05 significance level.

As depicted in Table 3, the highest values of TSS was recorded for plants treated with 5 g/l and 6 g/l concentration of dry yeast in *Yala* 2016 season compared to the control. There were no significant differences in TSS values of plants that are subjected to different treatments in *Maha* 2016/17 season.

Table 3. The effect of foliar spraying of dry yeast on total soluble solids of lettuce plant

Treatments	TSS		
Dry yeast (g/l)	*Maha* 2015/16	*Yala* 2016	*Maha* 2016/17
2	3.0^{ab}	2.8^{b}	3.9^{a}
3	2.2^{b}	2.8^{b}	4.2^{a}
4	2.7^{ab}	3.6^{a}	4.1^{a}
5	3.5^{a}	2.8^{b}	4.0^{a}
6	3.5^{a}	4.1^{a}	3.9^{a}
control	2.0^{b}	2.0^{c}	3.6^{a}
CV%	16.11	13.0	11.78
LSD	1.12	0.69	0.43

Note: Means followed by the same letter indicates that the difference between means are not statically significant at 0.05 significance level.

As shown in Table 4, the highest fresh weight of lettuce plant was produced by plant treated with 6 g/l concentration of dry yeast and the lowest fresh weights of lettuce were recorded for the control treatment and treatment 01 (concentration rate of 2 g/l). This pattern was observed in all seasons. With respect to dry weight of lettuce plant, the highest weight was observed in plants treated with dry yeast at a rate of 5 g/l and 6 g/l, while the lowest dry weight was observed in control plants in *Maha* 2015/16 season and in plant treated with 2 g/l concentration. Similar results were observed in all seasons except in *Yala* 2016 season.

Table 4: The effect of foliar spray of dry yeast on fresh and dry weight of lettuce plant

Treatments	Fresh weight of plant(g)			Dry weight of plant(g)		
Dry yeast (g/l)	*Maha* 2015/16	*Yala* 2016	*Maha* 2016/17	*Maha* 2015/16	*Yala* 2016	*Maha* 2016/17
2	175^{c}	125.0^{bc}	254.4^{cd}	1.8^{d}	15.2^{a}	12.1^{c}
3	188^{bc}	129.9^{bc}	281.2^{b}	2.8^{cd}	10.0^{bc}	15.2^{bc}
4	198^{ab}	143.5^{b}	295.6^{b}	5.4^{b}	14.9^{a}	17.7^{ab}
5	204^{ab}	150.0^{ab}	260^{bc}	9.9^{a}	8.1^{c}	20.5^{a}
6	208^{a}	178.4^{a}	372.2^{a}	9.8^{a}	11.2^{b}	20.8^{a}
Control	188^{bc}	103.5^{c}	206^{c}	3.6^{c}	8.2^{bc}	12.9^{c}
CV%	6.08	15.79	23.51	23.53	20.79	25.51
LSD	15.37	28.89	61.82	1.41	3.09	4.32

Note: Means followed by the same letter indicates that the difference between means are not statically significant at 0.05 significance level.

CONCLUSION

The results of the present investigation prove the ability of dry yeast, as a foliar spray, to increase plant growth and in turn to increase the total yield of lettuce.

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