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Effect of growth regulators on yield of oyster mushroom (*Pleurotus sajor-caju*)

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Abstract
In the present investigation attempts were made to study the effect of various growth regulators to find out most effective dose of the growth regulator for increasing the yield, mycelial growth and biomass production of oyster mushroom (*Pleurotus sajor-caju*). The investigation was undertaken during July-October, 2019 at the Plant Pathology Section of College of Agriculture, Kolhapur. Results of the investigation overtly indicated that the growth regulators tried at different concentrations in the present investigation, aiming at promoting yield of oyster mushroom (*Pleurotus sajor-caju*), exhibited significantly varied response to yield of mushroom and biological efficiency. However, amongst the various growth regulators used in the present investigation, spraying of gibberellic acid (GA) 10 ppm significantly demonstrated its efficacy over other treatments increasing total yield of mushrooms (856.81 g) and biological efficiency (85.68%).

Keywords: *Pleurotus sajor-caju*, growth regulators, yield

Introduction
Mushroom is a fungus shaped like an umbrella that grows in decomposing organic matter. Unlike most plants that produce seeds, mushrooms produce spores to continue the reproduction process. Mushroom farming is the process encompassing the growth, harvest, storage, and selling of mushrooms. It is scientifically known as floriculture. Mushroom is a form at plant life and known as fungus, a group of organisms, separate from plant and animals. Mushroom can be defined as macro fungus with distinctive fruiting body, which may be either epigeous or hypogeous. Mushroom grow all over world on various habit, varying from large heterogeneous groups, having varying shape, size, colour and all quite different in appearance and edibility (Chadha and Sharma, 1995) [2]. More than 15000 fleshy fungi have been identified, among them 2000 species are considered as edible throughout the world and more than 300 species have been reported from India (Chadha, 1994) [1].

Material and Methods
The substrate was spread with the solution of GA, IBA, NAA, 2,4-D and Kinetin @ 2 ppm, 5 ppm and 10 ppm separately in the one set of bags for each growth regulator at the time of spawning and the growth regulators (GA, IBA, NAA, 2,4-D and Kinetin @ 2, 5 and 10 ppm) were sprayed at the time of pin head formation and on one set of each treatment to observe the effect of growth regulators on yield of *Pleurotus sajor-caju*.

Results and Discussion
The results obtained from the present investigation effect of growth regulators on yield of oyster mushroom (*Pleurotus sajor-caju*) have been summarized under following heads:

Effect of growth regulators on yield of oyster mushroom (*Pleurotus sajor-caju*)
Data presented in Table 1 and fig. 1 pertaining to total yield of oyster mushroom (*Pleurotus sajor-caju*) per 1000 g dry weight of substrate, revealed significantly varied response of different growth regulators at different concentrations tried.
All the treatments of growth regulators exemplified substantial increase in total yield of mushroom per 1000 g dry weight of the substrate, in comparison to that obtained in untreated control. Growth regulators evaluated at different concentrations showed noticeably comprehensive variation in total yield of oyster mushroom (*Pleurotus sajor-caju*). However, amongst all the treatments, spraying of gibberellic acid (GA) 10 ppm yielded significantly highest yield of mushroom to the tune of 856.81 g.

Spraying of gibberellic acid (GA) @ 10 ppm, thus, was found most effective than rest of the treatments, which yielded 25.09% increase in yield over untreated control. Spraying of indole-3-butyric acid (IBA) 10 ppm were the next best treatment which yielded 822.47 g.

However, total yield of mushrooms with these treatments differed non-significantly, which suggests that spraying of indole-3-butyric acid (IBA) 10 ppm had identical effect in hastening yield of mushrooms. Followed by these treatments spraying of kinetin 10 ppm which yielded 788.99 g. The treatment of spraying naphthalene acetic acid (N.A.A.) 10 ppm was the next treatment in performance, which yielded 779.13 g. Least mushroom yield was obtained from 2, 4-dichlorophenoxy acetic acid (2,4-D) 10 ppm beds, which yielded 601.28 g.

Pal *et al*., (2013) [5] finding similar result on *Pleurotus euos.* The fresh yield of *P. eous* also differed significantly with different growth regulators. significantly higher yield (383.00 g) of *P. eous* was obtained in gibberellic acid and IBA (366.67 g). However, it was significantly lower (191.67 g) observed in 2, 4-D and next was NAA (223.33 g), cytokinine (241.67 g) whereas control recorded 357.67 g. The yield of *P. eous* was significantly were (371 g) recorded in gibberellic acid and IBA (360.0 g). The yield was comparatibly less noticed in 2, 4-D (185.00 g) which was closely followed by NAA (215.00 g). The mean of two months data clearly indicated that gibberellic acid (377.33 g) and IBA (363.33 g) gave better yield than other growth regulators and it varied from 188.33 g to 235.83 g.

Table 1: Total yield and biological efficiency of oyster mushroom (*Pleurotus sajor-caju)* as influenced by various growth regulators

Tr No.	Treatment Details	Total yield of mushroom (g)	Yield (%) increase or decrease over control	Biological efficiency (%)
T_1	Gibberellic Acid (GA) 2 ppm	726.27	6.03	72.63
T_2	Gibberellic Acid (GA) 5 ppm	772.88	12.84	77.29
T_3	Gibberellic Acid (GA) 10 ppm	856.81	25.09	85.68
T_4	Indole- 3- Butyric Acid (IBA) 2 ppm	731.06	6.73	73.11
T_5	Indole- 3- Butyric Acid (IBA) 5 ppm	770.74	12.52	77.07
T_6	Indole- 3- Butyric Acid (IBA) 10 ppm	822.47	20.10	82.25
T_7	Naphthalene acetic acid (N.A.A.) 2 ppm	719.89	5.10	71.99
T_8	Naphthalene acetic acid (N.A.A.) 5 ppm	750.20	9.53	75.02
T_9	Naphthalene acetic acid (N.A.A.) 10 ppm	779.13	13.75	77.91
T10	2, 4-dichlorophenoxy acetic acid (2,4-D) 2 ppm	651.88	-4.82	65.19
T11	2, 4-dichlorophenoxy acetic acid (2,4-D) 5 ppm	624.40	-8.83	62.44
T12	2, 4-dichlorophenoxy acetic acid (2,4-D) 10 ppm	601.28	-12.21	60.13
T13	Kinetin 2 ppm	722.50	5.48	72.25
T14	Kinetin 5 ppm	765.59	11.77	76.56
T15	Kinetin 10 ppm	788.99	15.19	78.90
T16	Control	684.91	-	68.49
S.E. m±		13.33	-	1.33
CD at 5%		39.96	-	4.00

Effect of growth regulators on biological efficiency of oyster mushroom (*Pleurotus sajor-caju*)

Data presented in Table 1 revealed significant variation in biological efficiency of oyster mushroom (*Pleurotus sajor-caju*) due to various treatments of growth regulators tried at different concentrations.

In the present investigation, growth regulators evaluated at different concentrations showed significant variation in biological efficiency of *Pleurotus sajor-caju*, which ranged between 60.13 and 85.68%. However, amongst all the treatments, spraying of gibberellic acid (GA) 10 ppm revealed significantly highest biological efficiency to the tune of 85.68%. Gibberellic acid (GA) @ 10 ppm, thus, was found to be most effective than rest of the treatments in enhancing biological efficiency of *Pleurotus sajor-caju*. Spraying of indole-3-butyric acid (IBA) 10 ppm were the next best treatment which yielded 82.25%. However, biological efficiency of mushrooms with these treatments differed non-significantly, which suggests that spraying of indole-3-butyric acid (IBA) 10 ppm had identical effect in hastening yield of mushrooms.

Followed by this treatment kinetin 10 ppm which yielded 78.90% biological efficiency. The treatment of spraying Naphthalene acetic acid (N.A.A.) 10 ppm was the next treatment in performance. Least biological efficiency was obtained in 2, 4-dichlorophenoxy acetic acid (2,4-D) 10 ppm treatment.

To abridge the results, spraying of gibberellic acid (GA) 10 ppm was the most effective in enhancing biological efficiency of *Pleurotus sajor-caju*.

Sarker and Chowdhury (2013) [6] documented that at 10 ppm level GA_3 had a positive effect on biological yield, economic yield and dry economic yield of oyster mushroom. Mohapatra and Behera (2013) [4] found that IAA @ 200 ppm stimulated higher yield in *V. volvacea* with a yield increase of 22.12% over control. Kaur (2016) [3] reported maximum yield of *Calocybe indica* with GA when sprayed at pinhead formation and at all stages. Results of the present investigations are in general agreement with the results of foregoing scientists.

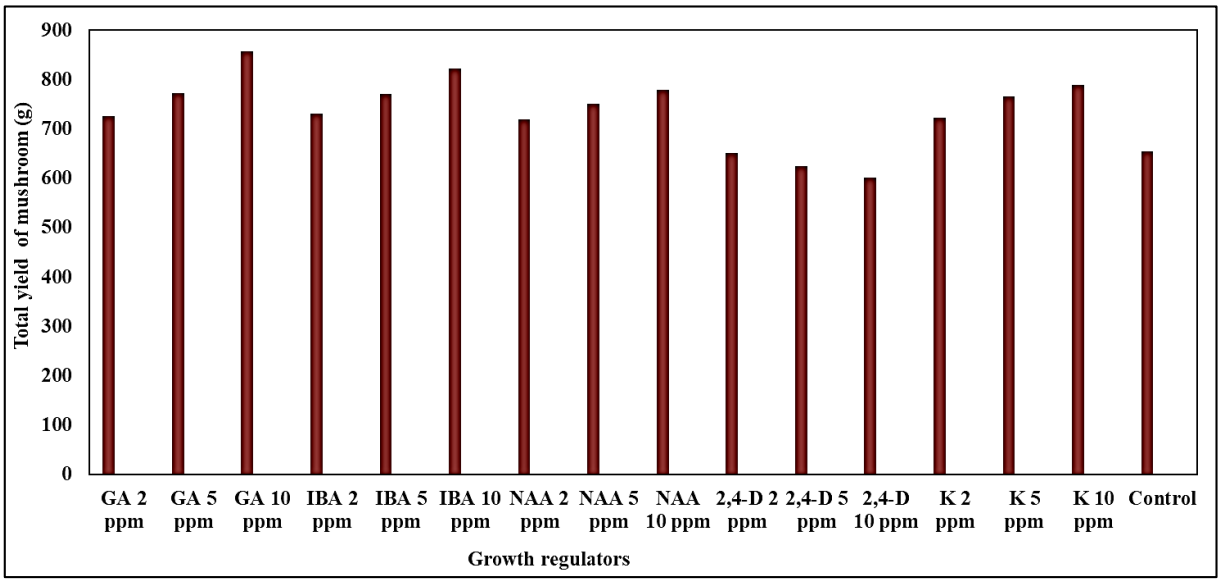

Fig 1: Pertaining to total yield of oyster mushroom

Conclusion

From the present investigation it is concluded that spraying of gibberellic acid at 10 ppm concentration on beds, at the time of spawn running and pinhead formation, is highly beneficial for increasing yield of oyster mushroom (*Pleurotus sajor-caju*).

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