Current Pharma Research
ISSN-2230-7842
CODEN-CPRUE6
www.jcpronline.in/

Research Article

Synthesis and growth promoting effects of some newly synthesized bromo and nitro substituted isoxazolines on some edible mushroom.

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Received 23 January 2019; received in revised form 14 February 2019; accepted 04 March 2019

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ABSTRACT
A mushroom (*Agaricus bisporus*) is one of the many species of fungi. About 3,000 different species of fungi can be found in Western Europe, approximately 50 of which are edible fungi, the mushroom is by far the most familiar one. A fungus is actually the visible fruit body of a mould and as such only a small part of that mould. The mould fungus, or mycelium, grows under the ground, invisible to the naked eye. This is a tight network of fine threads, which with some species can even extend across a surface area of several hectares. The present study deals with the effect of newly synthesized bromo and nitro substituted isoxazolines for their growth promoting impact on oyster mushrooms.

KEYWORDS
Oyster mushrooms, bromo and nitro substituted isoxazolines.

1. INTRODUCTION

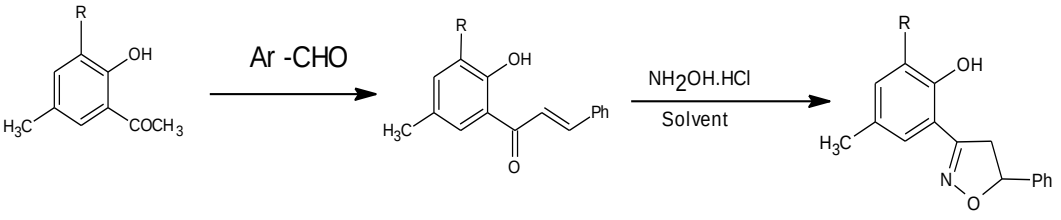
Mushroom cultivation is a profitable agribusiness world-wide. More than 2000 species of edible mushrooms exist in nature, but only approximately 22 species are intensively cultivated [1] could be employed for foods and medicines. In the fungal classification system proposed by Ainsworth and followed by J. Webster [2], almost edible mushrooms are members of the subdivision Basidio mycotina and Ascomycotina [3]. Mushrooms are a good source of protein, vitamins and minerals and are known to have a broad range of uses both as food and medicine. A high nutritional value of oyster mushrooms has been reported with protein (25-50%), fat (2-5%), sugars (17-47%), mycocellulose (7-38%) and minerals (potassium, phosphorus, calcium, sodium) of about 8-12% [4]. The cultivation of edible mushrooms has become an attractive economic alternative over past few years, mainly due to increase in its demand and market value [5,6]. Oyster mushrooms are one among the cultivable varieties. They are wide spread in temperate zones, can grow at moderate temperature and are suitable to grow in most places in India [7,8]. Oyster mushrooms are grown from hyphae (threadlike filaments) that become interwoven into mycelium and propagated on a base of steam sterilized cereal grain usually Wheat grains. This mycelium-impregnated cereal grain is called spawn and is used to inoculate mushroom substrate [8].

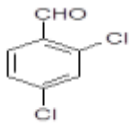
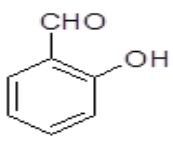
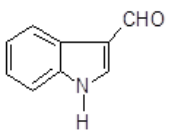
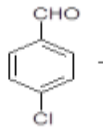
In the present study, the newly synthesized bromo and nitro substituted isoxazolines were assayed for their growth promoting impact on oyster mushrooms with predetermined periodicity.

2. MATERIALS AND METHODS

2.1. Synthesis of bromo and nitro substituted isoxazolines

A mixture of 1-(2-hydroxy-3- bromo and nitro -5-methyl phenyl-3-(4-chlorophenyl)-chalcone (Iva) (0.01 mole) and hydroxyl amine hydrochloride (0.02 mole) was refluxed in ethanol (20ml) and piperidine (0.5ml) for about 1.5 hrs. After cooling the reaction mixture was acidified with HCl (1:1).The solid product thus separated was filtered, washed first with sodium bicarbonate solution (10%) and then with water. Finally it was crystallized from ethanol to get the compound.



R=  ,  ,  ,  .

Spectral analysis of final compound is given below:

A) IR, 3241.21, (Vb);O-H stretching, 3087.43 (m), Aromatic C-H stretching; 2922.35 (s) Aliphatic C-H stretching; 1582.55, (s), >C=N stretching; 1288.00(s),>CO stretching; 1102.97, (s),>C-Br stretching

B) PMR : 2.3,s,3H,Ar-CH_3; 6.5,t ,1H, Heterocyclic -CH_2-CH-,6.9,d,2H, Heterocyclic -CH_2-CH-,7.1 - 8.4,m,5H,Ar-H, 12.4,s,1H,Ar-OH

2.1. Classification of Oyster Mushroom

Scientific classification

Kingdom – Fungi
Phylum – Basidiomycota
Class – Agaricomycetes
Order – Agaricales
Family – Pleurotaceae
Genus – Pleurotus
Species – ostreatus

2.2. Materials

1. Spawn (Source:- Agriculture College, Amravati)
2. Soya bean Straws.
3. Water bath
4. Hot Air Oven
5. Plastic Bags

2.3. Substrate Preparation

Oyster mushroom was grown on substrates soyabean straw. Since soyabean straw is easily available, cheap and widely used. It is used was fresh and well dried. It was chopped into 3-5 cm pieces and soaked in fresh water for 15-16 hours. Excess water was drained off. This was subjected for sterilization to minimizing contamination problem and gives higher and almost constant yields using hot water treatment maintained at 60-80°C for 1 hour. The sterilized substrate was taken out and allowed to lower down the temperature. When the sterilized substrate had cooled down to room temperature, it was ready for filling and spawning. At this stage, substrate moisture content was about 70%. Polythene bags were used for its cultivation. The spawns of experimental species P. sajor-cajuie, P. pulmonarius were procured from Shivaji agricultural agencies and cultivated in the culture house of the ICAR affiliated Krushi Vidyan Kendra, Durgapur (Badnera) Dist. Amravati. Spawning can be done in layer spawning. The experimental setup was divided into two parts i.e. 'A'-control group plants and 'B'-treated group plants. The spawns were inoculated and cultivated by the conventional methods. Substrate was filled in bag, pressed to a depth of 8-10 cm and broadcasted with a handful of treated spawn above it. Similarly, 2^{nd} and 3^{rd} layers of substrate were put and simultaneously after spawning, the bags were closed and 20-25 pin-holes were made on all sides of the packets. Similarly the untreated spawns were filled in control group beds (bags). After proper labeling, spawned bags were stacked on racks in neat and clean place, in closed position. Temperature at 25-35°C and

humidity at 70-85% was maintained by spraying water twice a day on walls and floor. It took 20-25 days when bags were fully covered. During this incubation period, appropriate temperature of the incubation room was maintained. After the complete development of mycelium, the packets were taken out of the incubation room and shifted to growing room, where the packets were hanged to bamboo frame. During the harvesting of mushroom beds were irrigated according to need. When the first primordial initiation was observed, the test compounds were sprayed on the mushroom with specific intervals. Mushroom crop was harvested before the fruiting body showed any splitting on the edges. The yields of mushroom crop from various bags with different parameters viz. length, diameter, weight and colour were recorded. The results of field experiments with test compounds are tabulated and shown in Fig. no. 1 and 2:

Table 1. Effect of titled compounds (Va-h) on oyster mushroom:-Pleurotussajor-caju spp.

Treated Bags	**Compound**	**D (cm)**	**T (cm)**	**L (cm)**	**Weight of Dry Bag (g) (After Harvesting)**	**Total**		**Colour**
						Fresh	**Dry**	
1	Va	7.7	0.5	5.8	0.925	211	20.43	White
2	Vb	8.4	0.4	5.8	0.982	195	17.59	White
3	Vc	10.9	0.6	6.9	0.975	225	21.31	Creamy
4	Vd	11.01	0.5	6.3	0.955	205	18.89	White
5	Ve	9.92	0.4	5.5	0.966	208	21.22	White
6	Vf	9.84	.0.5	6.2	0.978	209	20.45	White
7	Vg	8.64	0.6	6.4	0.976	207	20.99	Creamy
8	Vh	9.43	0.6	5.7	0.967	208	21.89	Creamy
9	1,4 Dioxane	6.0	0.4	6.1	0.895	174	19.13	White
10	Control	6.8	0.3	5.5	0.853	204	20.00	White

D=Diameter, T=Thickness, L=Length

2.4. Analysis of Mushroom Samples Treated With Test Compounds

The samples of P. sajor-caju collected during the experimental study of growth promoting impact were sun-dried and immediately proceeded for analysis of % crude fibre, % crude protein and elemental detection with special reference to N, P, K and S. The analysis of crude fibre percentage of the samples was carried out at Food Testing Laboratory, Krishi Vigyan Kendra, Durgapur (Badnera) Dist. Amravati using Pelicans FBS-06 (P) Laboratory Manuals & AOAC Method, whereas percentage of crude protein and element detection were determined at Analytical Lab, using Leaf method of analysis. The Kjeldahls method, UV spectrophotometer and Flame photometer were used for the analysis of N, P, K and S elements. The results of analysis obtained for treated mushroom samples are tabulated in table no. 2:

Table 2. Analytical results of dry oyster mushroom:-Pleurotussajor-caju spp. Treated with titled compound.

Sr. No.	Sample	% of Crude Fibre	% of Crude Protein	% N	% P	% K	% S
1	Va	8.0	15.13	2.421	0.3040	2.558	0.1262
2	Vb	8.72	16.00	2.560	0.3111	2.934	0.1367
3	Vc	10.3	20.27	3.246	0.3232	2.760	0.1320
4	Vd	9.83	18.90	3.024	0.2975	2.441	0.1314
5	Ve	10.65	17.05	2.574	0.2745	2.567	0.1378
6	Vf	9.67	18.01	2.654	3.1943	2.647	0.1475
7	Vg	7.89	16.77	3.143	0.3953	2.849	0.1541
8	Vh	8.44	17.23	3.143	0.3173	2.563	0.1498
9	1,4 Dioxane	8.06	13.25	2.122	0.272	2.344	0.1356
10	Control	5.64	15.95	2.554	0.364	2.741	0.1410

3. RESULTS AND DISCUSSION

A species of Oyster mushroom was treated with test compounds to examine the efficacy of the newly synthesized compounds (Va-h) on the morphology of treated mushroom species with inclusion of analysis of treated samples. When the treated and control species of mushroom were compared with reference to their morphological characters, it was interesting to note that the treated species exhibited significant growth in diameter and thickness of caps as well as lengthening of stripes. In addition to this, there was remarkable increase in the yields because of that healthy growth and disease free environment. The analytical results obtained for all the treated mushroom samples clearly show the increase in the value of crude fibre percentage as well as the crude protein percentage. The presence of elements like N, P, K and S were also analysed in the treated mushroom samples.. However, further investigation and a systematic approach in the light of agricultural science would certainly prove to be a potential tool for the growth promoting and creating ecofriendly environment for mushroom cultivation.

4. CONCLUSION

On the basis of chemical analysis and spectral data, it is concluded that, the synthesis of titled compounds was achieved successfully. Besides this, enhancement of the yields reveals the healthy growth due disease free environment. The newly synthesized compounds also showed noticeable enhancement in the nutritive values i.e. increase in crude fibre percentage and crude protein percentage. In this regard, the nitro substituted isoxazolines were found more effective in the enhancement of nutritive value.

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