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Evaluation of Anti-Plant Pathogenic Activity of Wild Mushroom in Rajasthan Region: A Critical Analysis

Ashwani Kumar[1]Arun Kumar[2]

[1]Research scholar, Sri Venkateshwara University Gajraula.
[2]Dr Arun Kumar, Associate Professor, Department of Plant Pathology, C.R. P.G. College, Muzaffar Nagar.

ABSTRACT

Today, "the world is facing significant challenges in modern health services because many antimicrobial agents have lost their effectiveness in treating infectious diseases mainly due to the development of microbial resistance. The exploration of bioactive compounds effective in the treatment of pathogenic microorganisms resistant to current drugs is very useful. Currently, there is a growing interest in the search for new antimicrobial agents from natural sources such as bacteria, fungi and plants. Natural products, in particular microbial and plant products, are the main sources of new drug molecules." In this investigation we will focus on the anti-plant pathogenic activities of the wild mushroom in Rajasthan region.

Keywords:*Anti-Plant, Pathogenic Activity, Wild Mushroom, Rajasthan.*

I. Introduction

The last "three decades have seen a dramatic increase in pathogen resistance for both agrochemicals and pharmaceutical fungicides. In agriculture, this translates into the extent of repeated application of chemical substances to crops or insufficient control of plant diseases. Furthermore, an important public concern is the need for safer and less environmentallyharmful agricultural chemicals. Prototypes of antifungal agents are now needed to address this solution. These agents must operate through a new mode of action, different from that of existing synthetic agents, to avoid cross-resistance with the currently available antifungal product. The successful discovery of new fungicides from natural products has required the development of new bio test techniques and protocols that allow the detection of small amounts of biologically active chemicals, which should be selective enough to determine the optimal target pathogen." Accordingly, considering the significance of higher mushrooms and wild mushrooms to have potential antifungal items, the present investigation work entitled "Anti plant pathogenic Activities of higher parasites particularly wild mushrooms".

Mushrooms are widely spread in nature. "They occur in climates ranging from the tropics to the tundra. They have wide range of habitat. They grow in humid places that have lignocellulolytic

material of coniferous and deciduous forests, in wood, desert sands, lake dunes, gardens, open fields, swampy places, in the piles of stored straw, farm manure, etc. Fungal species release several bioactive compounds such as terpenoids, flavonoids, tannins, alkaloids and polysaccharides. Mushrooms are immensely rich in bioactive compounds, but largely untapped, they are useful natural resources. These bioactive compounds are found in several cellular components and secondary metabolites, which isolated and identified from fruiting bodies. Fruiting bodies and mycelium of fungi exhibit values that promote health, such as immune stimulatory, antibacterial and antioxidant properties." The synergistic effect of these substances would give potential therapeutic values.

II. Objectives

- To explore an overview of "nti plant pathogenic activity of wild mushrooms and its classification."
- To evaluate the "anti plant pathogenic properties of wild mushrooms in Rajasthan Region"

III. Research Methodologies

A comprehensive three-year survey (2011, 2012 and 2013) was "conducted for the collection of naturally growing fungal flora during the rainy season from June" and it remains till mid-September and light rainfall occurs during this season especially in the months of June in the Alwar and Chittorgarh forest, Rajasthan.

The samples was wrapped in aluminum foil, "which offers good protection. Small plastic boxes will beused for woody basidiomycetes and as comicets. Care has been taken to avoid distortion of fleshy mushrooms and the sample has been labeled.

Method of Sample Preparation

To "inoculate each 250 ml conical flask containing 150 ml of PD broth, a small 2 x 2 mm square of the sterile mycelial culture of each of the fungi maintained in a sloping PDA was used. The bottles will be incubated for 30 days on a rotary stirrer at room temperature and 120 rpm. The 30-day culture was collected and filtered. The culture filtrates will be extracted with an equalvolume of ethyl acetate by division in a separating funnel (solvent-solvent extraction).The extracts from the culture filtrates was evaporate separately to dryness. The dried extracts obtained from the above will be reconstituted in a minimum amount of 50% aqueous methanol and then analyzed."

Statistical Analysis

The recorded data was "subjected to statistical analysis when necessary. The differences shown by the treatments in different experiments will demonstrate their importance using completely

randomized designs (CRD) according to the details provided by Gomez and Gomez (1983). All data was be analyzed using CPCS-1, SPSS, MS and other programs."

IV. Historical Overview of Mushrooms

Mushrooms are "fruit bodies of higher fungi. The term 'mushroom' is utilized as 'a macrofungus with a distinctive fruiting body, which can be hypogeous or epigeous, sufficiently huge to be seen with the naked eye and to be picked by hand, (Chang and Mile (1992)."“Wild mushrooms have been collected and consumed by individuals for thousands of years. The archeological record reveals edible species associated with individuals living 13,000 years ago in Chile yet it is in China where the eating of wild fungi is first dependably noticed, a few hundred years before the birth of Christ. In ancient Vedas, the impact of poisonous fungi was managed in a saying composed by Euripides in around 450 B.C. Edible fungi were collected from forests in ancient Greek and Roman occasions and profoundly esteemed, however more by high-positioning individuals than by workers. Caesar's mushroom (Amanita caesarea) is a token of an ancient tradition that still exists in numerous pieces of world."

Mushroom Species on the Earth

Mushrooms are "generally appropriated in nature. They happen in atmospheres extending from tropics to the tundra. They have wide environment run. They develop on clammy places having lignocellulolytic material of coniferous and deciduous forests, on wood, desert sands, lake dunes, gardens, open fields, marshy places, on the heaps of stored straw, farmyard manure and so on. From a taxonomic perspective, basicallybasidiomycetes (the spore droppers) yet additionally a few species of ascomycetes (the spore shooters) belong to mushrooms. The quantity of mushroom species on the earth is assessed to be 140,000, proposing that only 10% have been identified. Expecting 5%, proportion of helpful mushrooms among the unfamiliar and unexamined mushrooms, infers around 7,000 yet unfamiliar mushroom species of conceivable advantage to humankind. The higher basidiomycetes incorporate around 10,000 species from 550 genera and 80 families having plainly visible fruiting bodies. In any case, under 25 species are generally acknowledged as nourishment and only a couple have accomplished the degree of a thing of trade (Hawksworth 2001; Reshetnikov et al. 2001)." Different "mushrooms are dangerous and may cause poisoning whenever eaten (Meng and Li (1997). The vast majority of the poisonous mushrooms belong to the basidiomycotina, for the most part in variety Amanita *(Hymenomycetes, Amanitaceae), Inocybe, (Cortinariceae), Panaeolus (Coprinaceae) and Russula, (Russulaceae)* (Zhang et al.2004). By and by, in excess of 190 species of dangerous mushrooms belonging to 58 genera and 26 families are known from Asia, of these, 179 species are basidiomycees belonging to 50 genera and 20 families. In excess of 40 species are profoundly dangerous, and around 30 species may bring about death whenever consumed."

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V. Anatomy of Mushroom

A "mushroom is created from a nodule, or pinhead, of less than two millimeters in diameter, called primordium, which is usually found in the external part of the substrate or in its vicinity. It is framed within the mycelium, the mass of filiform hyphae that make up the growth. The primordium is amplified in a rounded structure of intertwined hyphae which are usually taken after an egg, called a 'button'. The button has a movement in cotton mycelium, the universal cover, which encloses the body of the creative fruit. As the egg grows, the universal layer breaks and can remain as a cup, or return to the base of the stem, or as moles or backward on the lid. Numerous mushrooms are missing on a universal cover; therefore, they do not have a volva or volval patch. Often, a second layer of fabric, the incomplete cover, covers the blade-shaped gills that contain spores. When the cover extends, the layer breaks and the remains of the cover in the middle can remain as a ring or a ring around the center of the stem or as fragments hanging on the edge of the cover. The ring can be like a skirt like in some Amanita species, a neckline like in many Lepiota species or simply the dark leftovers of a tent (a halfway layer made of fibers that look like a spider web), which is normal Class Cortinarius. Mushrooms that do not have fractional coverage do not frame a ring."

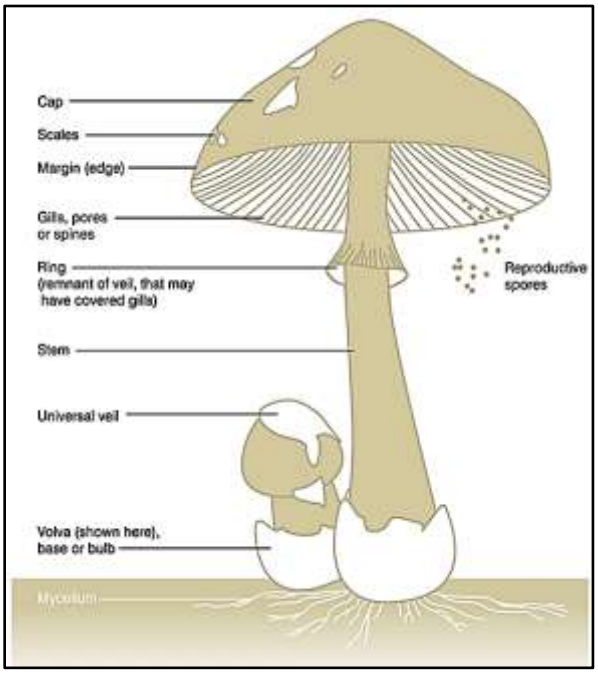

Figure 1: Anatomy of Mushroom

The "stem (also called stipe or stem) can be focal and strengthen the lid in the center, or it can be blurred or potentially parallel, as in the Pleurotus and Panus species. In other mushrooms, a stem may be missing, as in polypropylenes which structure the shelf-shaped sections. The balls blow short of a stem, but may have a support base. Other mushrooms, for example truffles, earth stars

and nests of winged animals, generally do not have stems and there is a specific mycological jargon to represent their parts."

The way "the gills connect to the highest point of the stem is a significant element of the fungal morphology. Mushrooms of the genera Agaricus, Amanita, Lepiota and Pluteus, among others, have free gills that do not extend to the highest point of the stem. Others have decadent gills that extend along the stem, as in the genera Omphalotus and Pleurotus. There is an extraordinary number of variations between the limits of the free and the current, collectively called attached gills. Better distinctions are often made to recognize the types of related gills: adnate gills, which are decisively based on the stem; bloody gills, which are marked at the point where they join the highest point of the stem; adjacent gills, which bend to find the stem, etc. These distinctions between connected gills are sometimes difficult to translate, as the connection of the gills can change as the fungus develops or with various environmental conditions."

VI. Classification of Wild Mushrooms

Normal mushrooms are "the fruiting bodies of individuals of the Agarical application, whose type of species is Agaricus and the type species is the field mushroom, Agaricuscampestris. However, in the current characterized molecular classifications, not all individuals in the Agarical application produce fungal fruiting bodies and many other branched mushrooms, collectively called mushrooms, occur in other orders of the Agaricomycetes class. For example, chanterelles are in Cantharellales, fake chanterelles, for example, Gomphus are in Gomphales, mushrooms (Lactarius, Lactifluus) and russulas (Russula), as well as Lentinellus, are in Russulales, while the extremes, leathery of the genera Lentinus and Panus are among the Polyporales, however, Neolentinus is in the Gloeophyllales, and the small class of spiked mushrooms, Rickenella, together with the comparative genera, are in the Imenotocalietali."

A "typical wild mushroom is the lobster mushroom, which is a parasitic fruiting body of a distorted Russula or Lactarius, cooked in the color of the lobster, colored and twisted by the ascomyceteHypomyceslactifluorummycoparasitary."

VII. Features of Wild Mushrooms

The "Crude dark colored mushrooms are 92% water, 4% carbohydrates, 2% protein and under 1% fat. In a 100 gram (3.5 ounce) sum, crude mushrooms give 22 calories and are a rich source (20% or a greater amount of the Daily Value, DV) of B vitamins, for example, riboflavin, niacin and pantothenic corrosive, selenium (37% DV) and copper (25% DV), and a moderate source (10-19% DV) of phosphorus, zinc and potassium (table). They have insignificant or no Vitamin C and sodium content. The vitamin D content of a mushroom depends on postharvest dealing with, specifically the unintended presentation to daylight. The US Department of Agriculture gave proof that UV-uncovered mushrooms contain substantial measures of vitamin D. At the

point when presented to bright (UV) light, much subsequent to reaping, ergosterol in mushrooms is converted to vitamin D2, a procedure currently utilized intentionally to supply new vitamin D mushrooms for the functional nourishment staple market. In a complete security evaluation of creating vitamin D in crisp mushrooms, researchers indicated that fake UV light innovations were similarly viable for vitamin D production as in mushrooms presented to common daylight, and that UV light has a long record of safe use for production of vitamin D in nourishment.

VIII.Evaluation of Anti Plant Pathogenic Properties of Wild Mushrooms

The previous three decades have seen "an emotional increment in pathogen protection from both agrochemicals and pharmaceutical fungicides. In horticulture, this converts into

the requirement for rehashed applications of concoction to crops or the lacking control of plant disease. In addition, a significant open concern is the requirement for more secure and less environmentally destructive agrochemicals. Presently prototype antifungal specialists are expected to address this solution. These operators must function by new method of action, not quite the same as those of existing synthetic specialists, to maintain a strategic distance from cross obstruction with as of now accessible antifungal item. Effective disclosure of novel natural item fungicides has required the development of new bioassay techniques and protocols that take into consideration the detection of limited quantities of organically active synthetic substances, which should be sufficiently specific to determine ideal objective pathogen.

Badalyan"et al. (2002) reported the antagonistic activity of 17 species of Basidiomycotinaxylootroph (Coriolusversicolor, Flammulinavelutipes, Ganodermalucidum, Hypholomafasciculare, Hypholomasublateritium, Kuhneromycesmutabilis, Lentinusususus, Lentinustusorusus, Lentinustusorusus, Lentinustusorusvarius and Schizophyllum commune) against Four fungi (Bipolarissorokiniana, Fusariumculmorum, Gaeumannomycesgraminis var. Tritici and Rhizoctoniacerealis), responsible for the disease of the feet and the roots of winter double cereals, culture experiments on agar potato dextrose were analyzed.

Occurrence of Mushrooms in Rajasthan Forest

Event of mushrooms in "woods has been accounted for by numerous specialists, for example, "Singer (1989) who announced 1320 species belonging to 129 genera under

Agaricales. Sharma and Doshi (1990) who revealed some new has of Pleurotus species from Rajasthan. Doshi and Sharma (1997) were recorded as wild mushrooms of Rajasthan."

Study Area

We have chosen two district Alwar (Sariska, Tehla, Sahori, Diwakari) and Chittaurgarh (Payri, Ashapura, Somnagar, Shiv Shakti Nagar) district forests. As we found that the geographical area

of Alwar is 8380 per sq Km is little bigger than chittaurgarh 7822 per sq Km. In Alwar area of very dense forest (VDF) 59 $Km^{2,}$ Moderately Dense Forest (MDF) 335 $Km^2$and Open Forest (OF) 803 Km^2 out of (Total) 1197 Km^2. But rather than Chittaurgrah area of very dense forest (VDF) Nil, Moderately Dense Forest (MDF) 220 $Km^2$and Open Forest (OF) 769 Km^2 out of (Total) 989 Km^2have been found from assessment 2017.

Distribution Frequency of Wild Mushroom in Rajasthan

Data on "the distribution frequencies of wild mushrooms have been displayed that Polyporus sp. (77.5%), Ganodermalucidum (73.33 %), Thelephora sp. (56.66%), Tricholoma sp. and Coprinus sp. (52.5%), Cariolusversicolor, Hypholomacapnoides and Marasmius sp. (48.33%) and Cantharelluscibarius (44.16%). The least distribution frequency (2.5%) was recorded.

Physiological Studies

For complete comprehension of "the physiological necessities of wild mushrooms, different parameters influencing the mycelia growth of the fungus, suitable temperature and pH prerequisites were examined and results are introduced as under."

Effect of Temperature

It was found at "the optimum temperature for the mycelia growth of the different mushrooms, the mycelium was developed on PDA plates and incubated at temperature running between 15-35°C for 10 days. Mycelial growths of the mushrooms were noted in terms of colony diameter."

Effect of pH

The "highest mycelial growth of 61.0, 58.0 and 48.5 mm of Lenzites sp. Russula sp. what's more, Cortinarius sp. was recorded at pH 5 and bit by bit diminished with the expanded pH. The mycelial growth of Mycena sp. demonstrated exceptional response to pH value. For this situation, mycelial growth expanded proportionally with the expansion of corrosiveness and alkality of the medium and the highest growth (58 mm) was at pH 6 followed by 56.0 mm growth at pH 8. The highest mycelial growth (81.0 mm) was recorded at pH 6 in Phellinus sp. While most reduced mycelia growth (8 mm) was found at pH 9 in the event of Amanita sp."

Antagonistic Activity Groups of Wild Mushroom

The "frequency of each kind and sub sort of reaction is showed that Halt was progressively visit (42.8%) than replacement (40.0%). In 42.8% pairing of the mushrooms shared inhibition at contact was increasingly common (26.7%) while inhibition at separation was 1.6%. In 40.0% pairing of the mushrooms halfway replacement was progressively common (19.2%) than over growth (13.6%) and complete replacement was 7.2%. Overall, 82.8% of pairingprompted prevention and limitation of fungal growth. This plainly shown the mushrooms were confrontational against the pathogenic fungi and that they generally worked through contact antagonism."

IX. Conclusion

Current research article on "the anti-plant pathogenic activity of wild mushroom was carried out to study the characterization of fleshy fungi for anti-pathogenic properties of plants in Rajasthan. Thirty-two genera were recorded as inedible, various edible and poisonous. *Boletus sp., Polyporus sp.,Ganodermalucidum and Tricholoma sp*. They were the most frequently distributed fungi. The antagonistic activities of 40 species of wild fungi against ten plant pathogenic fungi were tested by a dual culture technique. Most of the fungal species analyzed remarkably inhibited the mycelial growth of all phytopathogenic fungi. However, *Cordyceps sp., Marasmius sp., Stropharia sp. and Russula sp.* it was found that they have strong antagonistic activity."

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