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Impact Of Pesticides On Growth And Development Of Soil Mycoflora

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Abstarct: Pesticides are widely applied to increase agricultural productivity; however, their extensive use has resulted in several unintended ecological consequences. The present study investigates the impact of commonly used organophosphate, carbamate, and pyrethroid pesticides on the growth and development of soil mycoflora in agricultural soils of the Chintalapudi region. Soil samples were collected from pesticide-treated and untreated fields and analyzed for fungal population, colony morphology, and diversity indices using serial dilution and plate count methods. Results revealed a significant reduction in total fungal count and alteration in the dominant genera such as *Aspergillus*, *Penicillium*, *Rhizopus*, and *Fusarium* under pesticide exposure. The inhibition of spore germination and mycelial growth was more pronounced in soils treated with chlorpyrifos and carbendazim compared to less-persistent compounds. The study further demonstrated that continuous pesticide application adversely affects enzymatic activity and organic matter decomposition, thereby reducing soil fertility and microbial balance. The findings emphasize the need for adopting integrated pest management (IPM) practices and eco-friendly biopesticides to sustain soil health and agricultural productivity.

Keywords: Pesticides; Soil mycoflora; Fungal diversity; Microbial activity; Soil fertility; Chlorpyrifos; Carbendazim; Eco-toxicology; Integrated pest management; Soil health.

1. INTRODUCTION

Pesticides are chemical substances designed to control, repel, or eliminate unwanted plant and animal life, including herbicides, insecticides, and fungicides. Their extensive application in modern agriculture has significantly improved crop yields, yet it has also raised major environmental and ecological concerns. Globally, the demand for pesticides continues to increase, with Asia accounting for more than 50% of total usage. China ranks first in total pesticide consumption, while Saint Lucia records the highest usage per hectare. Once applied, pesticides undergo complex physicochemical processes in the soil—such as degradation, adsorption, desorption, and transport—which depend on the pesticide's chemical structure and soil properties (Laabs et al., 2007; Weber et al., 2004). These chemicals directly or indirectly interact with soil microorganisms, influencing their metabolic activities, enzymatic functions, and overall biomass (Singh & Walker, 2006). Microbial biomass serves as a sensitive indicator of soil health, nutrient turnover, and ecological balance (Schultz & Urban, 2008). Repeated pesticide applications during crop seasons lead to continuous accumulation in soil ecosystems. Their persistence often alters soil physicochemical properties and microbial dynamics (Aurelia, 2009; Sethi et al., 2013). While certain microorganisms develop adaptive mechanisms—utilizing pesticides as carbon or energy sources—others experience inhibition or death due to toxic exposure (Johnsen et al., 2001). The degree of inhibition or stimulation varies depending on the concentration, persistence, and bioavailability of the pesticide (Wang et al., 2006). Soil microorganisms play a vital role in maintaining fertility through processes such as decomposition, nutrient mineralization,

and nitrogen fixation. Pesticide-induced shifts in microbial diversity, abundance, and functionality can therefore disrupt these fundamental processes, resulting in long-term soil degradation.

2. FACTORS INFLUENCING PESTICIDE IMPACT ON MICROBIAL DIVERSITY

The impact of pesticides on soil microbial diversity is governed by a wide range of biotic and abiotic factors that collectively determine the intensity, persistence, and ecological consequences of chemical residues in soil ecosystems. The primary determinants include the chemical composition and concentration of the pesticide, soil texture, organic matter content, pH, moisture level, temperature, and prevailing agricultural practices (Abdel-Mallek et al., 1994). Microorganisms respond to pesticides in different ways depending on their physiological characteristics, enzymatic adaptability, and the surrounding environmental conditions. Understanding these factors is essential to assess the long-term sustainability of soil ecosystems under chemical stress.

2.1. Chemical Nature and Concentration of Pesticides

Each pesticide possesses unique chemical properties such as solubility, volatility, polarity, and degradation potential, which influence its interaction with soil microbes. Organophosphates, carbamates, and chlorinated hydrocarbons differ significantly in their persistence and mode of action. For instance, organochlorine pesticides such as DDT and endosulfan exhibit high stability and persist for years, continuously affecting microbial respiration and enzymatic activities. In contrast, organophosphates like chlorpyrifos and malathion degrade relatively faster but may still produce short-term toxicity to soil fungi and bacteria. The concentration of pesticide application is another critical determinant. Low concentrations may induce sublethal stress, leading to temporary inhibition of enzyme synthesis, while higher concentrations can cause irreversible cell membrane damage and metabolic arrest (Agnihotri, 1978; Abdel-Mallek et al., 1994).

2.2. Soil Texture, Organic Matter, and Adsorption–Desorption Dynamics

The bioavailability of pesticides is primarily influenced by soil texture and organic matter content. Adsorption and desorption processes within the soil matrix control the concentration of pesticide molecules available for microbial uptake or degradation (Bonczek & Nkedi-Kizza, 2007; Katagi, 2008). In clay-rich soils, pesticides are more strongly adsorbed to mineral surfaces and humic substances, which reduces their immediate toxicity but enhances persistence. Conversely, in sandy or low-organic soils, reduced adsorption leads to greater pesticide mobility and bioavailability, increasing the risk of microbial inhibition. Menon et al. (2004) observed that chlorpyrifos and quinalphos exhibited stronger inhibitory effects in loamy sand soils than in sandy loam soils due to lower clay content and reduced organic carbon, which enhanced pesticide accessibility to microbial cells. This indicates that soil physicochemical characteristics play a key role in determining the biological impact of pesticides. Organic matter acts as both a buffer and an energy source for microorganisms. High organic carbon in soil can bind pesticide residues, reduce their bioactive concentration, and promote microbial proliferation. In addition, organic amendments such as compost, farmyard manure, or crop residues stimulate microbial activity and may accelerate the biodegradation of toxic chemicals. Mishra and Pandey (1989) reported that supplementation with carbon and nitrogen sources such as glucose and amino acids mitigated pesticide toxicity in *Aspergillus* and *Trichoderma* species, suggesting that adequate nutrition can enhance microbial tolerance and detoxification capacity.

2.3. Soil Moisture, Temperature, and pH

Environmental parameters like soil moisture, temperature, and pH significantly influence both the persistence of pesticides and the activity of soil microbes. Optimal moisture conditions favor microbial metabolism and enzymatic degradation of pesticides, whereas extreme dryness or waterlogging may suppress microbial populations. Temperature affects the rate of pesticide hydrolysis and microbial enzymatic reactions. Generally, degradation rates increase with temperature up to a threshold beyond which microbial enzymes denature, reducing their efficiency. Similarly, soil pH governs the ionization and solubility of pesticides, influencing their availability to microbes. Acidic soils may enhance the mobility of certain pesticide ions, while alkaline conditions often favor chemical degradation. A balanced pH supports a diverse microbial population, ensuring effective pesticide breakdown and minimal ecological disruption.

2.4. Agricultural Practices and Tillage Systems

Agricultural management practices profoundly shape the soil environment and thereby influence the microbial response to pesticide exposure. Conventional tillage tends to disturb soil aggregates, increase aeration, and accelerate organic matter decomposition, often reducing microbial biomass. In contrast, no-tillage systems preserve soil structure and retain higher levels of organic carbon, which improves microbial resilience under pesticide stress. Murage et al. (2007) demonstrated that no-tillage systems maintained higher microbial diversity and enzymatic activity than conventional ploughed soils following pesticide

application. These systems enhance the formation of microhabitats that protect microbes from direct pesticide contact and favor gradual detoxification through microbial succession.

Crop rotation and the use of green manures or leguminous plants also influence microbial responses by altering rhizospheric conditions and nutrient availability. Regular inclusion of organic crops or biopesticides can rejuvenate microbial populations and reduce dependence on synthetic chemicals, ensuring ecological balance in agroecosystems.

2.5. Residual Effects and Soil Health Implications

Excessive and unregulated pesticide use leads to the accumulation of residues in the soil, resulting in long-term disturbances to microbial equilibrium. Persistent residues can modify soil pH, increase salinity, and impair essential biogeochemical cycles. Sarnaik et al. (2006) observed that repeated pesticide exposure decreased microbial biomass carbon and nitrogen, leading to reduced soil fertility and nutrient cycling efficiency. Similarly, Schuster and Schröder (1990) and De-Lorenzo et al. (2001) reported that pesticide residues adversely affect beneficial microorganisms responsible for organic matter decomposition and nitrogen fixation. The suppression of these microbes reduces soil enzymatic activity and organic carbon turnover, thereby accelerating soil degradation and infertility.

2.6. Interaction Between Microbes and Pesticide Degradation

Despite the detrimental effects of pesticides, certain microbial populations can adapt or evolve mechanisms to degrade these xenobiotics. Such adaptations involve the induction of specific enzymes like hydrolases, oxidases, and dehydrogenases that convert pesticide molecules into less toxic or metabolizable intermediates. These microbial interactions are influenced by environmental conditions and the availability of alternative substrates. Over time, selective pressure from continuous pesticide exposure may enrich resistant strains capable of detoxifying or mineralizing the compounds. This adaptive mechanism not only helps in natural bioremediation but also underscores the resilience and plasticity of soil microbial communities under chemical stress.

3. REVIEW OF LITERATURE

Soil microorganisms, particularly fungi, bacteria, and actinomycetes, play a crucial role in maintaining soil fertility, nutrient cycling, and organic matter decomposition. The indiscriminate and continuous use of chemical pesticides has raised serious concerns regarding their adverse effects on these beneficial soil microflora. Over the past five decades, numerous studies have been conducted to understand how pesticides interfere with soil microbial structure, function, and diversity. Domsch (1964) and Bartha et al. (1967) were among the earliest to report that organophosphate and organochlorine pesticides suppress microbial respiration and consequently reduce soil fertility. Their investigations demonstrated that even at recommended agricultural doses, these compounds caused a significant decline in microbial biomass, leading to alterations in nutrient availability and enzymatic activity. Similarly, Audus (1970) observed that sublethal concentrations of certain insecticides inhibited ammonification and nitrification processes, both of which are vital for maintaining nitrogen balance in soils. These findings suggested that pesticide residues, though often present in trace quantities, could exert long-term effects on soil microbial metabolism. Wainwright (1977, 1978) emphasized that the continuous accumulation of pesticides in agricultural soils can have persistent and cumulative impacts on microbial composition and activity. His studies highlighted that pesticide persistence depends on soil texture, organic matter content, and microbial degradative potential. Agnihotri (1978) and Mathur et al. (1980) further demonstrated that organophosphate and carbamate insecticides not only reduced soil enzyme activity but also significantly suppressed fungal populations such as *Aspergillus*, *Penicillium*, and *Rhizopus*. These fungal groups are known for their role in organic matter decomposition; hence, their reduction may ultimately affect soil structure and nutrient turnover. In addition, Shukla et al. (1987) examined the effect of fungicides such as Benomyl and Mancozeb on soil microflora. Their results showed a pronounced decline in rhizospheric microbial communities, particularly in the populations of beneficial fungi like *Trichoderma* and *Gliocladium*. These fungi are known for their antagonistic role against plant pathogens; thus, pesticide-induced suppression could indirectly increase plant disease susceptibility. Similarly, Moharram et al. (1994) reported that Profenofos inhibited cellulose and protein synthesis in *Aspergillus niger* and *Trichoderma harzianum*, leading to a decrease in soil organic matter decomposition. Such biochemical disruptions have profound implications on soil nutrient dynamics and overall fertility. Further research by Vischetti et al. (2000, 2002) and Liao et al. (2003) revealed that repeated application of copper-based fungicides not only reduced microbial biomass but also disrupted beneficial mycorrhizal associations in plant roots. These symbiotic fungi play a key role in phosphorus uptake and plant growth enhancement; hence, their inhibition can lead to nutrient deficiency and reduced crop productivity. Studies on glyphosate and other modern herbicides have also shown that

these compounds can alter microbial community structures, suppressing certain functional groups while allowing resistant strains to proliferate (Busse et al., 2001; Haney et al., 2000). Contrary to the general perception of pesticides as entirely detrimental, some studies have revealed adaptive responses among soil microorganisms. Fliessbach and Mäder (2004) and Cycon et al. (2006) reported that certain bacterial and fungal species develop tolerance to pesticide exposure, either through genetic adaptation or by utilizing pesticide molecules as alternative carbon and energy sources. This metabolic versatility indicates that soil microbial communities can undergo selective enrichment, favoring resistant species capable of degrading or detoxifying xenobiotics. Such processes are significant for natural bioremediation and the long-term resilience of agricultural ecosystems. Johnsen et al. (2001) and Martinez-Toledo et al. (1998) further highlighted the dynamic interplay between pesticide residues and microbial degradation mechanisms. Their work demonstrated that microbial populations can evolve enzymatic pathways that transform complex pesticide molecules into less toxic or inert compounds, contributing to natural detoxification of soils. However, this process is often slow and incomplete, depending on environmental conditions such as pH, temperature, and organic matter content. Recent studies (Pampulha & Oliveira, 2006; Sarnaik et al., 2006; Hemanth et al., 2016) have reinforced that chronic pesticide exposure reduces microbial diversity, enzymatic efficiency, and nutrient mineralization rates. The decline in soil microbial activity is often associated with reduced decomposition of crop residues and accumulation of undecomposed organic matter. Consequently, long-term pesticide use alters soil physicochemical characteristics, leading to compaction, reduced aeration, and decreased water-holding capacity.

4. MATERIALS AND METHODS

4.1. STUDY AREA AND SAMPLING

The investigation was conducted on agricultural farms in Chintalapudi, Andhra Pradesh. Soil samples were collected 20 days after crop emergence from 0–20 cm depth using a soil auger. Untreated samples served as controls, while test plots were treated separately with commonly used local pesticides—fungicides (Mancozeb, Carbendazim), insecticide (Dimethoate), and herbicide (Glyphosate). Samples were collected 15–20 days after fungicide application and 10 days after insecticide application from fields cultivating rice, sugarcane, and groundnut. The samples were stored at 4°C until microbiological analysis.

4.2. MICROBIAL ENUMERATION

The fungal population was quantified using the dilution plate count technique (Waksman, 1922). Twenty fungal species belonging to genera *Aspergillus*, *Penicillium*, *Fusarium*, *Curvularia*, *Absidia*, *Acremonium*, *Alternaria*, *Atkelia*, *Aureobasidium*, *Beltraniella*, *Bipolaris*, *Gliocladium*, *Mucor*, *Pythium*, *Rhizopus*, and *Trichoderma* were identified based on morphological features.

5. RESULTS AND DISCUSSION

5.1. GENERAL OBSERVATIONS

The results of the present investigation revealed a marked decline in fungal populations in pesticide-treated soils compared to untreated controls. This reduction was evident across all agricultural fields studied, indicating that the application of chemical pesticides exerts a substantial inhibitory effect on soil mycoflora. Among the different cropping systems analyzed, soils under rice cultivation exhibited the highest fungal diversity (35.8%), followed closely by groundnut (34.0%) and sugarcane (30.1%). The variation in fungal diversity among crops could be attributed to differences in crop residue composition, root exudates, and pesticide application frequency. *Aspergillus niger* emerged as the dominant species in all soil types, constituting approximately 13.47% of the total isolates, followed by *Penicillium chrysogenum*, *Rhizopus stolonifer*, *Fusarium oxysporum*, and *Trichoderma harzianum*. The predominance of *A. niger* may be due to its high tolerance to environmental fluctuations and ability to metabolize a wide range of organic substrates, including pesticide residues. The decline in overall fungal population after pesticide treatment corroborates the findings of Elain (2001) and Liao et al. (2003), who reported that pesticide application significantly alters soil microbial community structure and reduces beneficial microflora. The absence or suppression of beneficial species can lead to soil sterility, nutrient imbalance, and diminished fertility over time. The colony-forming unit (CFU) counts in pesticide-treated soils were considerably lower than those in control soils, indicating that pesticide residues interfere with fungal spore germination and hyphal growth. Morphological observations also revealed that colonies grown in treated soils appeared less pigmented and exhibited reduced sporulation, reflecting physiological stress induced by chemical exposure. These results

collectively suggest that continuous pesticide use disrupts microbial equilibrium and weakens the soil's natural regenerative capacity.

5.2. EFFECT OF FUNGICIDES

Fungicide application significantly decreased fungal diversity and abundance in all soil samples. Soils treated with Mancozeb and Carbendazim at a concentration of 0.5 L showed the extinction of several fungal species, including *Acremonium implicatum*, *Gliocladium virens*, and *Trichoderma harzianum*. When the concentration was increased to 1 L, additional species such as *Mucor recemosus* and *Pythium spinosum* were completely inhibited, suggesting a dose-dependent toxicity pattern. Mancozeb exerted a stronger inhibitory effect than Carbendazim, a result consistent with earlier findings by Pozo et al. (1994) and Shukla et al. (1987), who observed that dithiocarbamate fungicides exhibit broad-spectrum antifungal activity that extends to non-target soil microflora. The pronounced impact of fungicides can be explained by their direct interference with fungal metabolic pathways. Mancozeb is known to inhibit essential enzymes involved in respiration and cell membrane synthesis, while Carbendazim interferes with mitotic spindle formation, thereby preventing cell division. Such biochemical disruptions lead to reduced mycelial growth, sporulation, and nutrient assimilation. Consequently, the microbial-mediated decomposition of organic matter and recycling of nutrients such as nitrogen and phosphorus are significantly impaired. Microscopic observations in this study revealed that spores of *Trichoderma* and *Aspergillus* species exhibited abnormal morphology and delayed germination following fungicide exposure. This observation aligns with previous reports that prolonged fungicide treatment alters the physiological integrity of fungal cell walls and reduces enzyme secretion (Menon et al., 2004). These findings indicate that while fungicides serve an essential role in crop disease management, their excessive or repeated application could have serious repercussions for soil health and sustainability.

5.3. EFFECT OF INSECTICIDES

Insecticide treatments produced comparatively milder effects on fungal populations. Dimethoate, an organophosphate compound, was evaluated at concentrations of 0.5 L and 1 L. At the lower concentration, no fungal species were completely eradicated, although the total colony counts exhibited a slight decline. However, at 1 L concentration, four fungal species—primarily *Penicillium chrysogenum*, *Cladosporium herbarum*, *Curvularia lunata*, and *Alternaria alternata*—were eliminated in sugarcane and groundnut soils. The moderate toxicity of Dimethoate may be attributed to its relatively faster degradation and lower persistence compared to chlorinated insecticides. Although the initial impact was less pronounced, prolonged use may lead to cumulative effects, as reported by Abdel-Mallek et al. (1994) and Agnihotri (1978). These results suggest that while insecticides are toxic to soil fungi, their disruptive potential is generally lower than that of fungicides. Nevertheless, the sublethal stress induced by insecticides may still affect enzyme activity and soil respiration, ultimately influencing the decomposition rate of organic matter and nutrient turnover. Insecticide residues can also indirectly influence fungal diversity by modifying soil pH and altering the population of bacterial competitors. Some studies (De-Lorenzo et al., 2001) have demonstrated that organophosphate insecticides interfere with microbial-mediated nitrogen fixation and phosphate solubilization. This implies that even limited suppression of fungi may cascade into larger disruptions of soil biochemical cycles.

5.4. EFFECT OF HERBICIDES

Among herbicides tested, glyphosate had a noticeable impact on soil fungal communities. At 0.5 L concentration, total fungal counts decreased moderately, whereas at 1 L concentration, fungal populations declined by approximately 65–75% compared to control soils. The reduction was particularly significant in *Fusarium oxysporum* and *Penicillium* species, which are known contributors to soil organic matter turnover. These findings align with those of Martinez-Toledo et al. (1998) and Busse et al. (2001), who observed that glyphosate suppresses soil fungi by interfering with the shikimic acid pathway, an essential biochemical route for aromatic amino acid synthesis. Additionally, glyphosate's chelating property may immobilize micronutrients such as manganese and iron, depriving microbes of essential cofactors required for enzymatic activity. Although glyphosate is less toxic than fungicides, its long-term application can gradually reduce microbial biomass and shift community composition toward resistant strains. Interestingly, some fungal genera such as *Aspergillus* and *Rhizopus* showed resilience to glyphosate exposure, suggesting their

adaptive potential under chemical stress. This resistance could be due to the presence of metabolic pathways capable of partial degradation or detoxification of herbicidal residues (Fliessbach & Mäder, 2004). The emergence of such tolerant species indicates the beginning of microbial selection pressure in pesticide-treated soils.

5.5. COMPARATIVE ANALYSIS

A comparative assessment of the different pesticide categories revealed the following order of toxicity toward soil fungi:

Fungicides > Herbicides > Insecticides.

This hierarchy suggests that fungicides, designed specifically to target fungal metabolism, exert the greatest non-target impact on beneficial soil fungi. Herbicides, although less specific, still influence microbial activities indirectly by altering soil chemistry and nutrient availability. Insecticides, while generally less disruptive, may still contribute to long-term soil degradation through cumulative toxic effects. The pronounced decline in soil fungal biodiversity under pesticide stress indicates potential risks to soil fertility, organic matter decomposition, and overall ecosystem resilience. The depletion of beneficial species such as *Trichoderma harzianum* and *Gliocladium virens* can reduce biological control potential against phytopathogens, while the suppression of decomposers like *Aspergillus* and *Penicillium* slows organic matter turnover. These cascading effects ultimately reduce nutrient mineralization efficiency and crop productivity. Hemanth et al. (2016) similarly emphasized that indiscriminate pesticide use leads to microbial imbalance and deteriorates soil structure and fertility. Long-term dependency on chemical pesticides can therefore result in a self-reinforcing cycle of declining soil health and increasing pest resistance, necessitating even higher chemical inputs. The results of the present study reaffirm the need for adopting integrated pest management (IPM) approaches, organic amendments, and biofertilizer use to restore microbial balance and sustain agricultural productivity.

6. CONCLUSION

Pesticides, though indispensable for pest and disease management, exert profound effects on soil microbial ecology. The present study demonstrates that continuous and excessive pesticide application—especially fungicides such as Mancozeb—leads to a significant decline in soil fungal biomass and diversity. Such alterations disrupt nutrient cycling and enzymatic activities, contributing to long-term soil degradation. Sustainable agricultural practices must therefore prioritize judicious pesticide use, integrate biological control measures, and encourage soil restoration strategies to maintain ecological balance and soil fertility.

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Table 1 : Fungi isolated from soil samples not treated with pesticides.

S.No	Name of the Organism	Rice	Sugaecane	Groundnut	Total	%	Mean±SD
1	*Absidia glauca*	4	0	3	7	1.07	2.33±1.69
2	*Acremonium implicatum*	3	0	2	5	0.76	1.66±1.24
3	*Alternaria tenuissima*	12	7	9	28	4.28	9.33±2.05
4	*Aspergillus flavus*	15	19	16	50	7.65	16.66±1.69
5	*Aspergillus niger*	32	26	30	88	13.47	29.3±2.49
6	*Aspergillus oryzae*	14	14	15	43	6.58	14.33±0.47
7	*Atkelia rolfsii*	3	2	2	7	1.07	2.33±0.47
8	*Aureobasidium pullulons*	2	1	2	5	0.76	1.666±0.47
9	*Beltraniella humicola*	3	2	1	6	0.91	2±0.81
10	*Bipolaris oryzae*	13	6	6	25	3.82	8.33±3.29
11	*Curvularia lunata*	20	15	19	54	8.26	18±2.16
12	*Fusarium Oxysporium*	17	14	16	47	7.19	15.66±1.24
13	*Fusarium solani*	18	16	16	50	7.65	16.66±0.94
14	*Gliocladium virens*	3	0	1	4	0.61	1.33±1.24
15	*Mucor recemosus*	3	3	3	9	1.3	3±0
16	*penicillium aurentiogriseum*	17	15	19	51	7.81	17±1.63
17	*Pencillium chrysogenum*	20	18	17	56	8.57	18.33±1.24
18	*Pythium spinosem*	5	2	5	12	1.83	4±1.41
19	*Rhizopus stolonifer*	17	16	15	48	7.35	16±0.61
20	*Trichoderma harizianum*	11	7	13	31	4.74	10.33±2.49
21	*unknown*	10	5	12	27	7.46	9±2.94
	Total	**242**	**188**	**222**	**653**		
		11.52	**8.95**	**10.57**			

Table 2 : Fungi Isolates From Soil Samples Treated With 1/2 Lit Pesticides

S. No.	Name of the Organism	Mancozeb				carbandizam				Dimethonate				Glyphosphate			
		Rice	Sugar cane	Ground nut	Mean±SD	Rice	Sugar cane	Ground nut	Mean±SD	Rice	Sugar cane	Ground nut	Mean±SD	Rice	Sugar cane	Ground nut	Mean±SD
1	*Absidia glauca*	3	2	3	2.66±0.47	3	0	1	1.3±1.24	4	1	3	2.6±1.24	4	2	2	3±0.86
2	*Acremonium implicatum*	1	0	1	0.6±0.47	3	0	1	1.3±1.24	2	0	1	1.0±0.6	1	0	0	0.33±0.47
3	*Alternaria tenuissima*	10	6	8	8.0±1.63	19	11	16	15.3±3.29	21	15	17	17.6±2.49	17	11	14	14±2.44
4	*Aspergillus flavus*	24	18	22	21.3±2.49	23	13	17	17.6±4.10	22	16	19	18.6±2.05	26	20	22	22.66±2.49
5	*Aspergillus niger*	42	33	39	38±3.74	52	41	46	46.3±4.49	56	45	50	50.3±4.49	48	33	45	42±6.48
6	*Aspergillus oryzae*	9	5	7	7±1.6	17	11	14	14.3±2.05	19	14	16	16.3±2.05	12	6	9	9±2.44
7	*Atkelia rolfsii*	1	0	0	0.33±0.47	3	0	2	1.6±1.24	3	1	0	1.3±1.24	1	0	0	0.33±0.47
8	*Aureobasidium pullulons*	1	0	0	0,33±0.47	2	0	1	1±0.81	1	0	0	0.3±0.47	1	0	0	0.33±0.47
9	*Beltraniella humicola*	1	0	0	0.33±0.40	2	0	1	1±0.81	1	0	0	0.3±0.47	1	0	0	0.33±0.47
10	*Bipolaris oryzae*	9	6	8	7.66±1.24	16	9	12	12.3±2.86	19	14	17	16.6±2.05	12	9	11	10.6±1.24
11	*Curvularia lunata*	24	16	20	20±3.26	32	23	26	27±3.74	39	32	36	35.6±2.86	29	18	25	23.6±4.49
12	*Fusarium Oxysporium*	22	15	18	18.3±2.86	29	24	26	26.3±2.05	31	26	28	28.3±2.05	25	23	20	22.6±2.05
13	*Fusarium solani*	27	22	18	22.33±3.68	38	28	32	32.6±4.10	42	35	38	38.3±2.86	33	22	29	28±4.54

14	*Gliocladium virens*	1	0	0	0.33±0.47	2	0	1	1±0.81	1	0	0	0.3±0.47	1	0	0	0.33±0.44
15	*Mucor recemosus*	12	6	8	8.66±2.49	18	12	15	15±2.44	15	9	12	12.0±2.44	12	11	9	10.6±1.24
16	*penicillium aurentiogriseum*	18	11	14	14.3±2.86	28	20	25	24.3±3.29	33	26	29	29.3±2.86	22	16	19	19±2.44
17	*Pencillium chrysogenum*	21	17	19	19±1.63	29	21	25	25±3.26	35	26	30	30.3±3.68	24	20	22	22±1.6
18	*Pythium spinosem*	1	0	0	0.33±0.47	3	0	1	1.3±1.24	2	0	1	1±0.81	1,	0.2	0.8	0.66±0.33
19	*Rhizopus stolonifer*	21	17	19	19±1.63	34	25	18	25.6±6.54	27	20	25	24±2.94	24	17	19	20±2.94
20	*Trichoderma harizianum*	2	0	1	1±0.81	4	1	2	2.3±1.24	3	0	1	0.3±1.24	1	0	0	0.46±0.41
		250	**159**	**205**		**357**	**239**	**282**		**376**	**280**	**323**		**250**	**174**	**205**	
		12.5	**8.7**	**10.25**		**17.85**	**11.98**	**14.1**		**18.8**	**14**	**16.15**		**14.75**	**10.41**	**12.36**	

Table 3 : Fungi Isolates From Soil Samples Treated With 1 Lit Pesticides

S.No	Name of the Organism	Mancozeb				carbandizam				Dimethonate				Glyphosphate			
		Rice	Sugar cane	Ground nut	Mean± SD	Rice	Sugar cane	Ground nut	Mean± SD	Rice	Sugar cane	Ground nut	Mean± SD	Rice	Sugar cane	Ground nut	Mean± SD
1	*Absidia glauca*	0	0	0	0±0	0	0	0	0±0	1	0	0	3.0±0.47	1	0	1	0.66±0.47
2	*Acremonium implicatum*	0	0	0	0±0	1	0	0	3.0±0.47	0	0	0	0±0	0	0	0	0±0
3	*Alternaria tenuissima*	2	0	1	1±1.8	9	6	8	7.6±1.24	11	6	9	8.6±2.05	7	5	7	6.33±0.94
4	*Aspergillus flavus*	5	2	4	3.6±1.2	9	5	7	7±1.6	12	7	9	9.3±2.05	7	4	6	5.6±1.2
5	*Aspergillus niger*	13	9	11	11±1.63	22	15	18	18.3±2.86	21	12	17	16.6±3.6	18	10	15	14.3±3.2
6	*Aspergillus oryzae*	3	1	2	2±0.8	9	7	8	8±0.8	5	3	4	4±0.8	7	4	6	5.6±1.2
7	*Atkelia rolfsii*	0	0	0	0±0	1	0	0	3.0±0.47	2	0	1	1±0.8	0	0	0	0±0
8	*Aureobasidium pullulons*	0	0	0	0±0	0	0	0	0±0	0	0	0	0±0	0	0	0	0±0
9	*Beltraniella humicola*	0	0	0	0±0	1	0	0	3.0±0.47	2	0	1	1±0.8	0	0	0	0±0
10	*Bipolaris oryzae*	4	1	3	2.6±1.24	9	5	7	7±1.6	10	6	8	8±1.6	7	3	6	5.3±1.6
11	*Curvularia lunata*	11	6	9	8.6±2.05	22	16	19	19±2.4	27	17	22	22±4.0	15	6	13	11.3±3.8
12	*Fusarium Oxysporium*	14	9	12	11.6±2.05	25	18	22	21.6±2.86	27	17	18	20.6±4.49	19	17	18	18±0.81

13	*Fusarium solani*	12	7	9	9.33±2.05	19	14	17	16.6±2.05	22	16	18	18.6±2.49	17	12	14	14.3±2.05
14	*Gliocladium virens*	0	0	0	0±0	1	0	0	3.0±0.47	0	0	0	0±0	0	0	0	0±0
15	*Mucor recemosus*	2	0	1	1±0.8	10	5	8	7.6±2.05	6	4	5	5±0.81	5	3	4	4±0.81
16	*penicillium aurentiogriseum*	7	3	5	5±1.6	12	7	9	9.3±2.05	16	14	15	15±0.8	9	4	6	6.33±2.05
17	*Pencillium chrysogenum*	9	4	7	6.66±2.05	21	16	19	18.6±2.05	18	15	17	16.6±1.24	13	8	11	10.6±2.05
18	*Pythium spinosem*	0	0	0	0±0	1	0	0	3.0±0.47	2	0	1	1±0.8	0	0	0	0±0
19	*Rhizopus stolonifer*	5	3	4	4±0.8	18	13	18	16.3±2.35	12	9	10	10.3±1.24	8	5	7	6.6±1.24
20	*Trichoderma harizianum*	2	0	1	1±0.8	8	5	0	7±1.4	7	5	6	6±0.81	4	3	4	3.6±0.47
		89	**45**	**69**		**198**	**132**	**160**		**201**	**131**	**161**		**137**	**84**	**118**	
		4.45	**2.25**	**3.45**		**9.9**	**6.6**	**8.1**		**10.05**	**6.55**	**8.05**		**6.85**	**4.2**	**5.9**	

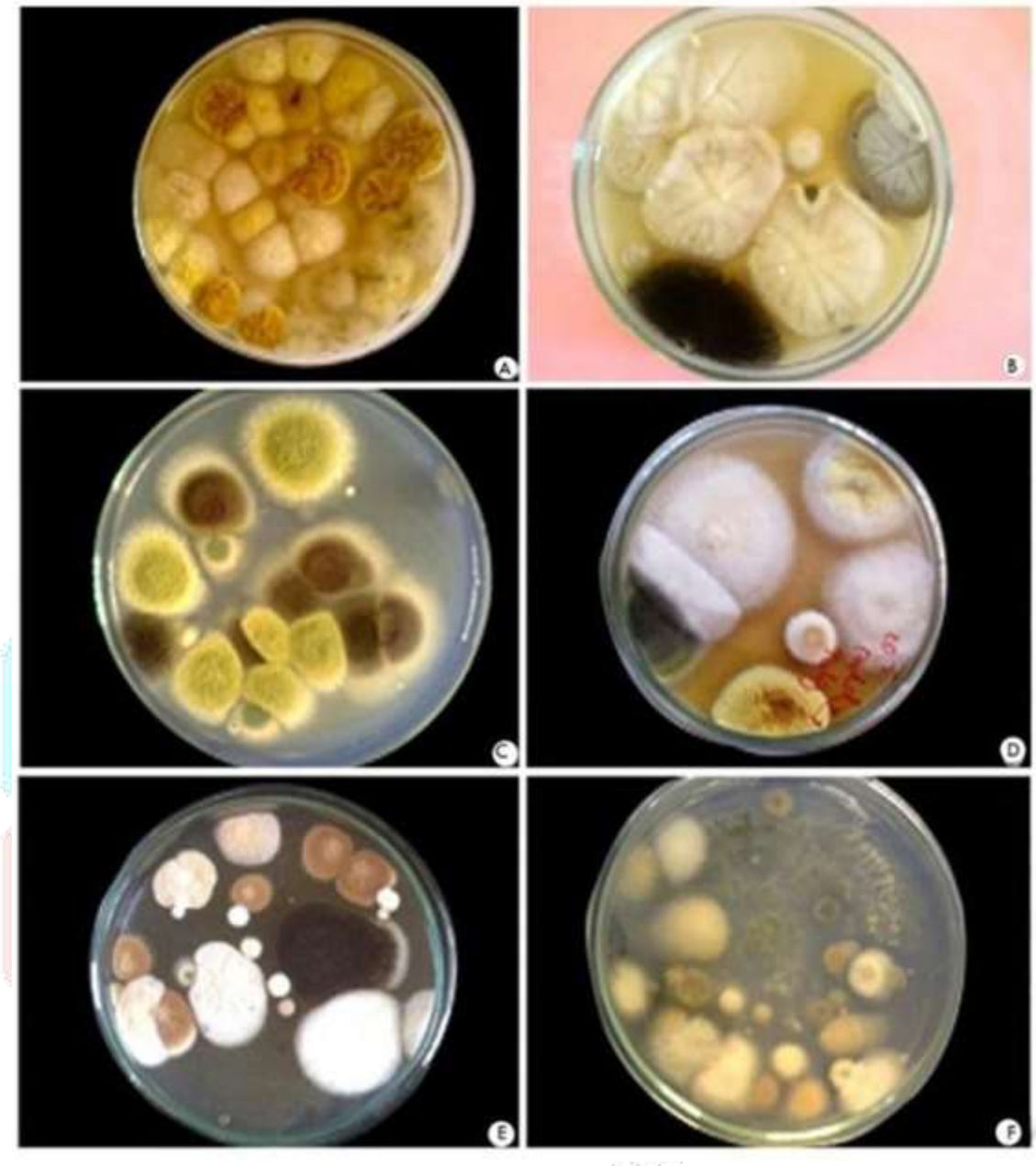

Fig.1. Fungual colonies on PDA from solis treated with pesticides *Mancozeb, Glyphosate, Dimethoate*