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Effect of Heat and Trypsin on the Selected Plant Extract Efficacy of Chilli

Monika Singh[1], Dr. Kanchan Awasthi[2]

[1]Research scholar, Department of Botany, Maharishi University of Information Technology, Lucknow
[2]Associate Professor, Department of Botany, Maharishi University of Information Technology, Lucknow

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ABSTRACT:

This study was mainly focused on antifungal activity of selected seven plant species viz. A. indica, A. vasica, A. sessilis, C.hirsutus, M. parvifolia, P. paniculata, and T. bellirica. The main aim of the study is to analyse the stability of extracts against C. capsici. The Ethanolic and methanolic plant extracts were treated with temperatures (50 and 100 °C) and trypsin. Efficacy of all plant extract inradial growth inhibition ofC. capsici are summarized. Significant difference was reported in growth inhibition of C. capsici, when extract was treated at 50 and 100 °C. Inhibition of radial growth of fungus after treatment with extracts at 50 °C and 100 °C has been analysing.

KEYWORDS: Chilli, C. Capsici, Heat stability, Trypsin, plant radial growth, inhibition, fungus etc.

1. INTRODUCTION

India is world's fifth-largest chilli producer, followed by China, Maxico, Turkey, & Indonesia. India has become world's top producer & exporter of chilli, with exports to United States, Canada, the United Kingdom, Vietnam, Germany, East and South Asia, and many other nations worldwide. India (25%) and China (24%) are the world's top chilli exporters. Indian chilli is well-known across the world for its vivid color and high pungency levels, and these two characteristics provide Indian chilli economic value.

Chilli was grown on 774.9 thousand hectares in India, generating 1492.10 thousand tons with a productivity of 1.93 tonnes per hectare (Anonymous, 2002). During 2021-22, Indian chilli covered 6.94 lakh hectares (17.14 lakh acres), yielding 15.78 lakh tons at a productivity of 2689 kg per hectare (1088 kg per acre). In India, the largest chilli-producing states are Andhra Pradesh (7 lakh tonnes), Telangana (4.33 lakh tonnes), Madhya Pradesh (3.03 lakh tonnes), Karnataka (1.85 lakh tonnes), and Odisha (0.69 lakh tonnes), accounting for 44,27,19,12, and 4 percent of total output, respectively.

Export demand in 2022-23 is expected to reach 5.70 to 5.90 lakh MTdue to increased premium grade output in the expanding areas of AP, Telangana, and Karnataka. Because of the increased availability of premium quality and increasing demand, mainly from China, the United States, Bangladesh, Malaysia, and Indonesia. In 2021-22, India exported 5.57 lakh tonnes worth Rs 8581 crore.

When compared to other countries, India is world's greatest user and producer of chili. India is the world's leading producer of chili, followed by China, Thailand, and Pakistan. Chilli agriculture covers around 20.20 million hectares globally, with a yield of 37.62 million tons. India is the world's leading chilli producer, producing 13.76 million tons per year, followed by China, which produces around 3 million tonnes. India contributes 36.57 percent of the world's total chilli production of 37.62 million tons, followed by China at 7.97 percent.

More South Asian countries rank among the world's top producers of dried chilis and peppers. Bangladesh was ranked fifth in 2020, generating around 158,000 tons. Pakistan was right behind, with an annual production of over 142,000 tons. While India hopes that a stronger harvest would ease the shortfall beginning in January 2023, its neighbor to the northwest is now dealing with crop-damaging weather conditions in its main chili growing area.

Indian chilli is well-known for 2 significant commercial qualities: its color & pungency levels. Some types of chilli are known for their red color due to pigment, while otherquality factors inchilli include skin thickness, length, & breadth. India, China, Thailand, Mexico, United Kingdom, Sweden, & Germany are among countries that consume most chilli. However, India is the only supplier of spicy chillies.

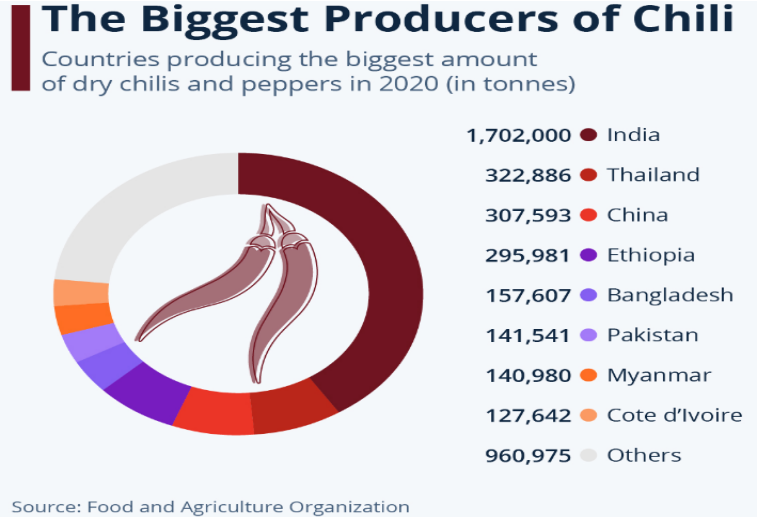


Figure 1: Country-wise share in chilli production

OBJECTIVES OF THESTUDY

- To study the heat stability and proteolysis degradation of test plant extracts.

2. REVIEW OF LITERATURE

Hajji-Hedfi, L., Rhouma, A., Al-Judaibi, A.A. et al. (2024) has studied the aqueous extract of Capsicum annuum seeds was screened for its phytochemical constituents & assessed at various concentrations (10, 20, 30, & 60%) for antifungalactivity in vitro. The study found that aqueous extract at 60% concentration was most effective in vitro when mycelial growth was <3.8 mm, growth inhibition was $>52\%$, and growth rate was <1.05 mm/h. In vivo, combined treatments of tomato seeds reduced gray mold damage by 8.67%. The most favorable growth parameters of seedlings were chlorophyll a >1.50 mg/g.f.Wt., chlorophyll b >1.76 mg/g.f. Wt., total chlorophyll content >3.26 mg/g.f.Wt., seedling fresh weight >0.43 g, and seedling length >12.43 cm, respectively. The aqueous extract of C. annuum seeds coupled with salicylic acid suppressed B. cinerea, indicating that it might be a viable and environmentally friendly alternative to chemical fungicides for long-term agricultural sustainability in the face of climate change.

S.K. Sudirga et al. (2023) investigated plant extracts' ability to inhibit the growth of the pathogenic fungus Colletotrichum acutatum, which causes anthracnose disease in chili. This study identified twenty potential plant species for future investigation. The leaf was extracted using the maceration method in methanol and n-hexane. The chemical element composition was constant throughout the GC-MS examination. All of the leaf extracts tested for bioactivity did well in colony and diffusion assays. Six of the 20 plant species studied were shown to be capable of inhibiting C. acutatum fungus growth: Piper nigrum, Piper ornatum, Piper retrofractum, Ficus septica, Samanea saman, and Tithonia diversifolia.

Sousa et al. (2022) investigated antifungal activity of ethanolicextracts of Dipteryx punctata leaves, stems, and fruits at concentrationsof 10 percent, 20 percent, 30 percent, 40 percent, and 50% (w/v). At 40% and 50% concentrations, D. punctate stem and fruit extracts reduced the diameter of Colletotrichum musae spots on banana fruit.

Jadesha and Velappagounder (2021) evaluated fungicidal effect of 25 medicinal plants; Ageratum conizoide (Floss flower),Ocimum sanctum (Tulasi), Azadirachta indica (Neem), Allium sativum (Garlic), A. cepa (Onion), Ocimum basilicum (Sweet basil), Plectranthus barbatus (Marunthukoorkan) , Adenocalymma alliaceum (Garlic creeper),Catharanthus roseus (Red periwinkle), Datura metel (Oumathum), Eclipta alba

(Karisalankani), Eucalyptus lobules (Eucalyptus), Jatropha curcas (Jatropha), Lantana camara (Lantana), Nerium odorum (Arali), Psoralea corylifolia (Karpogaarsi), Bougainvillea spectabilis (Bougainvillea), Ricinus communis (Castor), Solanum torvum (Turkeyberry), Prosopis juliflora (Mesquite), Vitex negundo (Notchi), Andrographis paniculate (Nilavembu), Solanum trilobatum (Purple-fruited pea Eggplant),Tridox procumbens (Tridax daisy) and Aegle marmelos (Bael), belonging to 17 different families against banana anthracnose disease caused by C. musae. Maximum antifungal activity was shown by Solanum trilobatum, among all medicinal plants.

Costa et al. (2019) investigated the metabolite interaction of Penicillium digitatum and Penicillium citrinum using mass spectrometry. The former isa postharvest disease ofcitrus fruits that causes significant losses. During the interaction, two tetrapeptides (deoxycitrinadin A, citrinadin A,chrysogenamide A, & tryptoquialanines) were discovered and shown antifungal efficacy against P. digitatum and P. citrinum.

Birari et al. (2018) investigate the effect of Bavchi seeds (Psoraleacorylifolia), datura leaves (Datura sp.), & ghaneri leaves (Lantanacamera) on Colletotrichum capsici. The poisoned food approach was used to evaluate doses ranging from 250 to 1000 µl. At 1000µl concentration, a methanolic extract of Psoralea corylifolia inhibited C. capsici the most effectively.

Boonrung et al. (2017) investigated antifungal characteristics of 2 volatile chemicals, thymol and R-(-)-carvono, at 12 and 25 °C. At 12 °C, 20% Thymol alone inhibited fungal growth, whereas a combination of 15% carvono and 20% Thymol suppressed Colletotrichum gloeosporioides more effectively.

Balashanmugam et al. (2016) shown that plant extracts may also be used to synthesize nanoparticles. In their investigation, silver nanoparticles were produced using anaqueous leaf extract of Cassiaroxburghii. Plant-assisted nanoparticles were evaluated against three plant fungal diseases (Rhizoctoniasolani, Fusarium oxysporum, & Curvullaria sp.), and the nanoparticles had more antifungal activity than the conventional antifungal medication amphotericin B.

Baize et al. (2014) tested aqueous and methanol leaf extracts from 21 plants against Colletotrichum musae. Compared to Prosopis julifloria, 2% leaf extract of Acacial albida inhibited fungal conidial germination more effectively. The aqueous extract was shown to be heat stable in antifungal activity, followed by P. julifloira.

Chen et al. (2013) tested an extract of Jerusalem artichok (Helianthus tuberosus L.) against nine fungi, including Botrytis cinerea, Colletotrichum gloeosporioides, Phytophthora capsules Leonian, the fungus Rh cerealis, Exserohilum turcicum, Gaeumannomyce sgramin, Gibberella zeae, Pyricularia, and Sclerotinia sclerotiorum. The leaf extracts from these plants included six phenolic compounds. Only three compounds, caffeic acid, 3,4-dicaffeoylquinic acid, and 1,5-dicaffeoylquinic acid, demonstrated significant antifungal activity against B. cinerea, C. gloeosporioides, Phytophthora capsici Leoniam, and R. cerealis.

Masangwa et al. (2012) conducted assays against Colletotrichum lindemuthianum and Colletotrichum dematium using acetone and aqueous extractsof Ipomoea batatas,Carica papaya, Allium sativum,Syzygium cordatum,Chlorophytum comosum, & Agapanthuscaulescens at concentrations of 0.78, 1.56, 3.13, 6.25, and 12.5 mg/l.

3. METHODOLOGY

The heat stability test was performed by heating extracts to 50 and 100 °C for 5 minutes. The foodpoisoning approach was employed to assess antifungal activity following therapy. Rizzello et al. (2011) showed how to determine proteolysis by treating extracts with trypsin. The trypsin was dissolved in 1%, w/v of 0.25 M Tris– HCl (pH 5.8). 500 µl of plant

extract dissolved in an appropriate solvent and the 100µl buffered enzyme solution was mixed. Mix solution incubated for 5 hat 25 ±2 °C, and reaction was stopped after boiling mixture for three min. The pH of the solution was then changed to 6.0, and antifungal activity was assessed using the food poisoning approach.

4. RESULT

To study the stability of extracts against C. capsici. The Ethanolic and methanolic plant extracts were treated with temperatures (50 and 100 °C) and trypsin.

HEAT STABILITY

Efficacy of all plant extract inradial growth inhibition ofC. capsici are summarized in table 1. Significant difference was reported in growth inhibition of C. capsici, when extract was treated at 50 and 100 °C. Inhibition of radial growth of fungus after treatment with extracts at 50 °C and 100 °C has been shown in table 1. Ethanolic leaf and stem extract of A. indica exhibited 87.19 ± 2.60% and 91.70 ± 1.97% inhibition against the C. capsici, respectively. While the same extracts exhibited 64.39 ± 2.00% and 61.53 ± 0.90% inhibition of growth when heated at 100 °C (Fig. 1).

TABLE 1 ANTIFUNGAL ACTIVITY OF DIFFERENT EXTRACTS AT DIFFERENT TEMPERATURES

EXTRACTS	**50˚C**		**100˚C**	
	LEAF	**STEM**	**LEAF**	**STEM**
*A.vasica*ethanolic	86.58±1.66^{ab}	90.84±0.37^{a}	82.87±1.32^{a}	69.18±1.85^{bc}
*A.indica*ethanolic	87.19±2.60^{a}	91.70±1.97^{a}	64.39±2.00^{c}	61.53±0.90^{bc}
*A.sessilis*ethanolic	95.42±0.69^{a}	87.12±1.47^{a}	78.25±2.49^{b}	90.80±1.61^{a}
*P.paniculata*ethanolic	84.50±1.24^{b}	-	92.75±2.28^{a}	-
*A.vasica*methanolic	72.60±3.22^{c}	64.60±1.42^{b}	48.65±4.61^{e}	60.15±0.78^{bc}
*A.indica*methanolic	72.58±1.92^{c}	57.42±1.18^{c}	56.89±0.75^{d}	77.96±0.59^{b}
*A.sessilis*methanolic	77.96±0.59^{bc}	55.48±0.23^{c}	49.59±0.92^{e}	40.89±1.25^{c}

Similar result was observed in methanolic leaf extract heated at 50 °C of A. indica against the fungus. 72.58 ± 1.92% inhibition was observed with the extract heated at 50 °C, while 56.89 ± 0.75% inhibition of C. capsici was observed by the same extract heated at 100 °C (Fig.1).

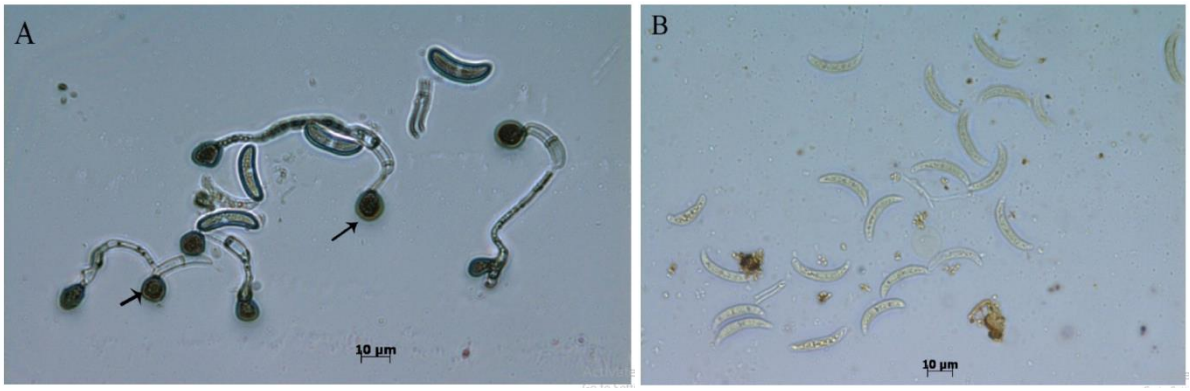


FIG. 1. EFFECT OF ETHANOLIC LEAF EXTRACTOF A. VASICA (5 MG/ ML) ON CONIDIAL GERMINATION AFTER 48 HOURS (B). WHERE (A) REPRESENT CONTROL. BLACK ARROW INDICATED APPRESSORIA FORMATION

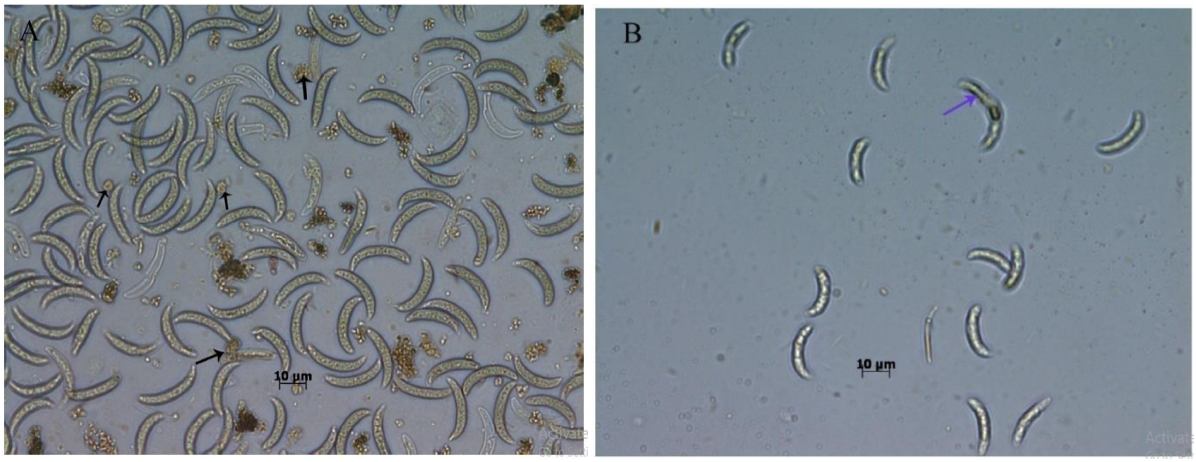


FIG. 2 EFFECT OF A.VASICA EXTRACTS ON CONIDIAL GERMINATION AFTER 48 HOURS. WHERE METHANOLIC LEAF EXTRACT (A) ETHANOLIC STEM EXTRACT (0.5 MG /ML) (B). BLACK ARROW INDICATED APPRESSORIA FORMATION AND BLUE ARROW INDICATE GERM TUBE FORMATION

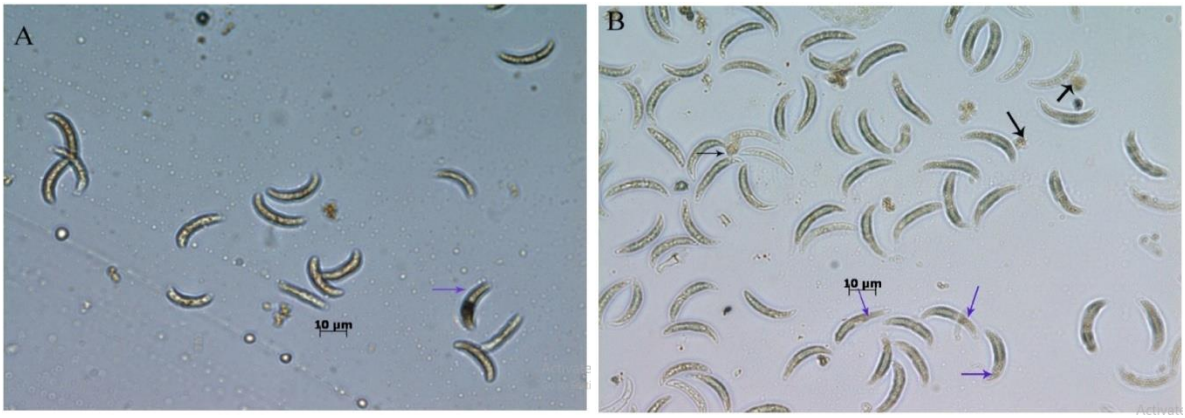


FIG. 3 EFFECT OF A. VASICA EXTRACTS ON CONIDIAL GERMINATION AFTER 48 HOURS. WHERE ETHANOLIC STEM EXTRACT (5 MG/ ML) (A) METHANOLIC STEM EXTRACT (B). BLACK ARROW INDICATED APPRESSORIA FORMATION AND BLUE ARROW INDICATE GERM TUBE FORMATION

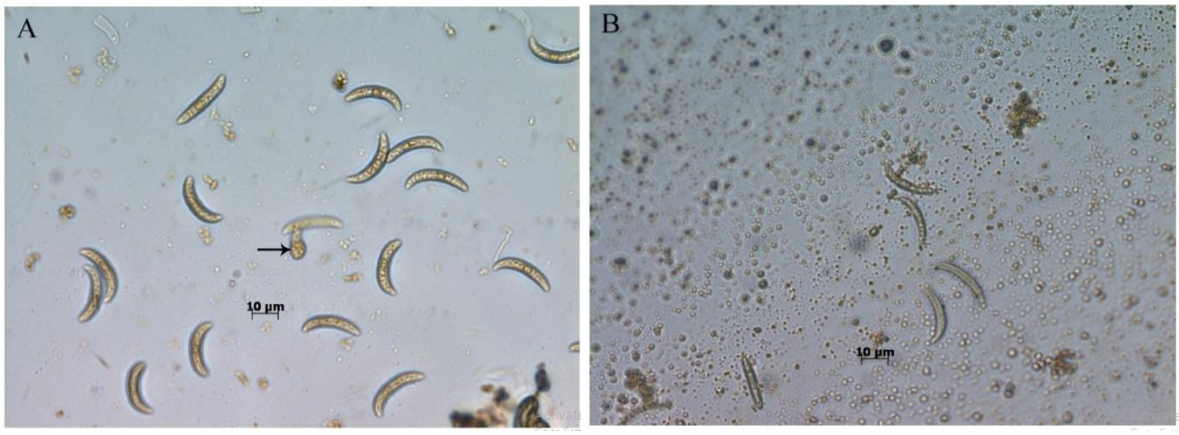


FIG. 4 EFFECT OF A. INDICA EXTRACTS ON CONIDIAL GERMINATION AFTER 48 H. WHERE ETHANOLIC LEAF EXTRACT (0.5 MG/ML) (A) ETHANOLIC LEAF EXTRACT (5 MG/ML) (B). BLACK ARROW INDICATED APPRESSORIA FORMATION AND BLUE ARROW INDICATE GERM TUBE FORMATION

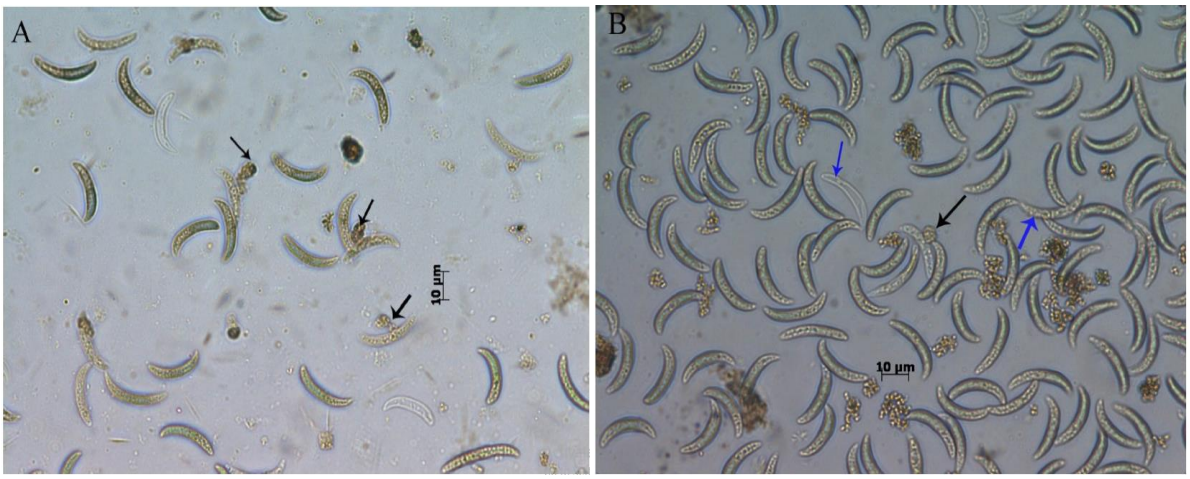


FIG. 5 EFFECT OF A. INDICA EXTRACTS ON CONIDIAL GERMINATION AFTER 48 H.WHERE METHANOLIC LEAF EXTRACT (A) ETHANOLIC STEM EXTRACT (0.5 MG/ML) (B). BLACK ARROW INDICATED APPRESSORIA FORMATION AND BLUE ARROW INDICATE GERM TUBE FORMATION

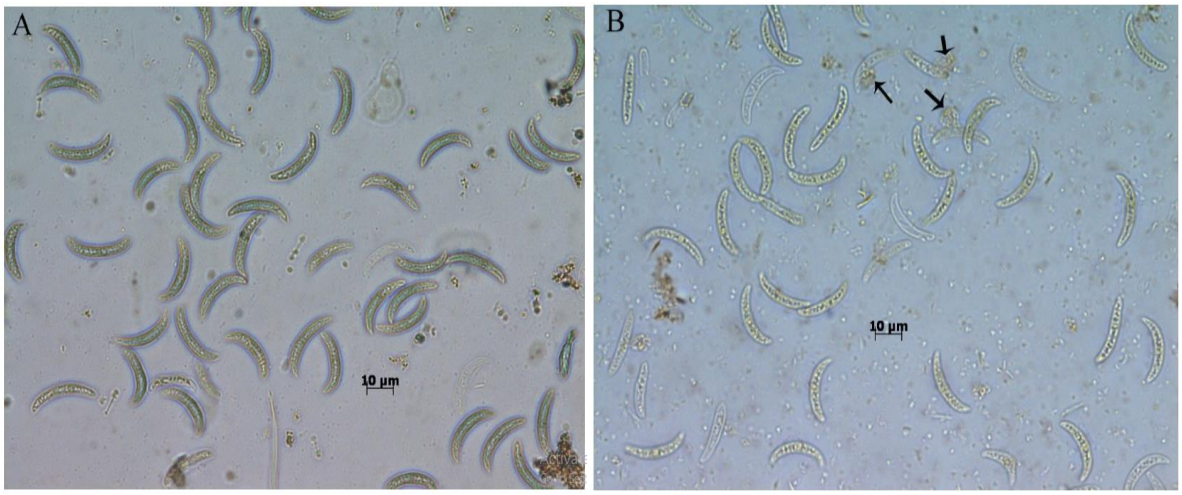


FIG. 6 EFFECT OF A. INDICA EXTRACTS ON CONIDIAL GERMINATION AFTER 48 H. WHERE ETHANOLIC STEM EXTRACT (4 MG/ML) (A) METHANOLIC STEM EXTRACT (B). BLACK ARROW INDICATED APPRESSORIA FORMATION

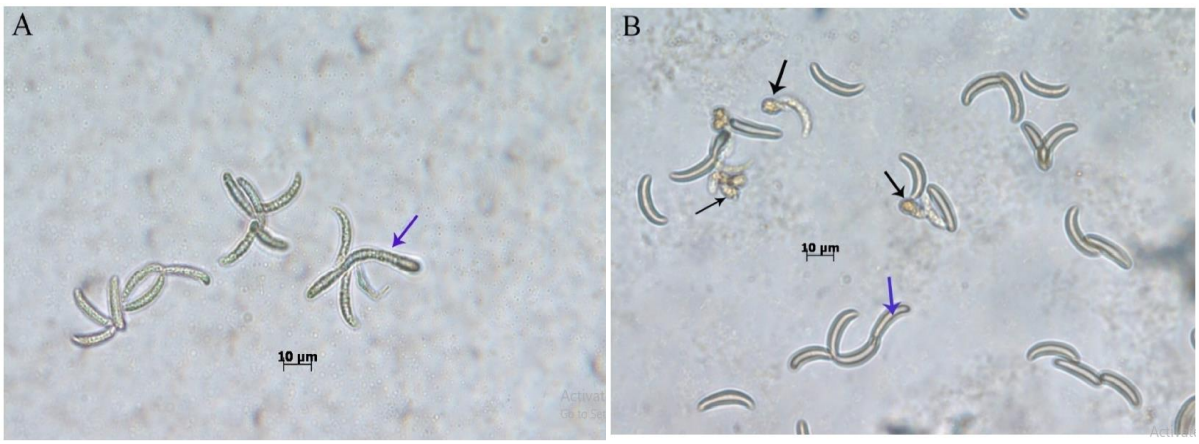


FIG. 7 EFFECT OF A. SESSILIS ETHANOLIC LEAF (A) AND STEM (B) EXTRACT ON CONIDIAL GERMINATION AFTER 48 H AT 5 MG /ML. BLACK ARROW INDICATED

APPRESSORIA FORMATION AND BLUE ARROW INDICATE GERM TUBE FORMATION

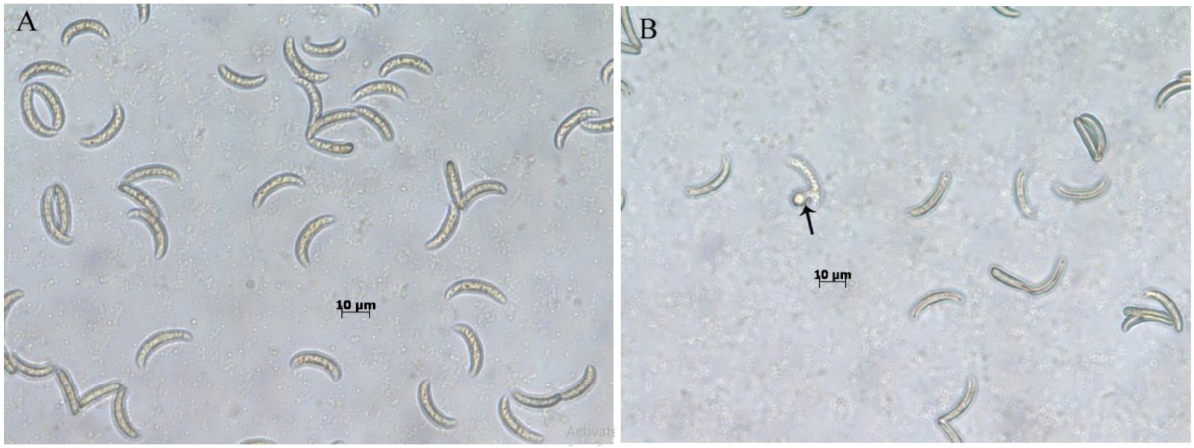


FIG. 8 EFFECT OF A. SESSILIS EXTRACTS METHANOIC LEAF (A) AND STEM EXTRACT (B) ON CONIDIAL GERMINATION AFTER 48 H AT 5 MG /ML. BLACK ARROW INDICATED APPRESSORIA FORMATION AND BLUE ARROW INDICATE GERM TUBE FORMATION

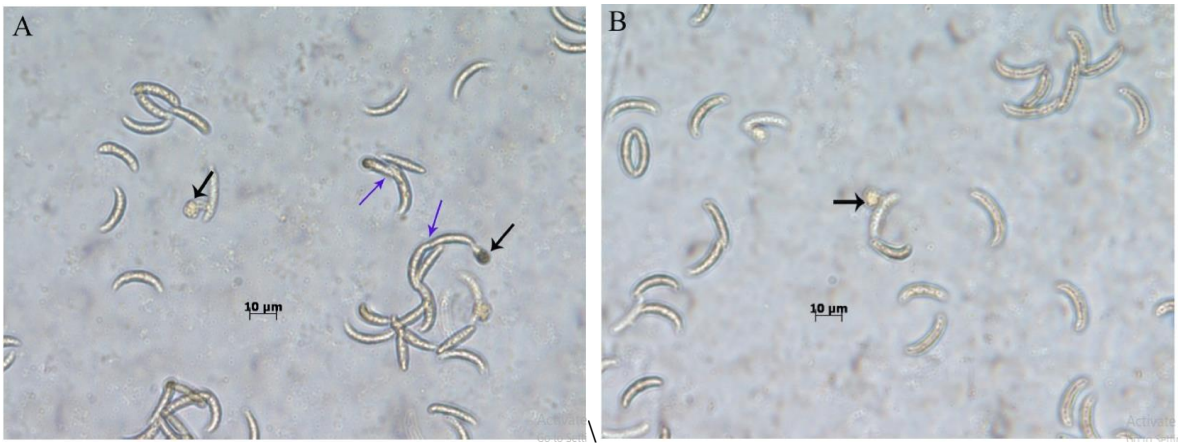


FIG. 9 EFFECT OF P. PANICULATA ETHANOIC LEAF (A) AND METHANOLIC LEAF (B) EXTRACTS ON CONIDIAL GERMINATION AFTER 48 H AT 5 MG /ML. BLACK ARROW INDICATED APPRESSORIA FORMATION AND BLUE ARROW INDICATE GERM TUBE FORMATION

Each value isexpressed as mean of triplicates, & column sharing same alphabetical letters arenot significantlydifferent ($p \leq 0.05$). – represents no inhibition in radial growth.

Heating an ethanol extract of A. vasica leaves to 50°C and 100°C inhibited C. capsici growth by 86.58 ± 1.66% and 82.87 ± 1.32%, respectively. A.vasica's methanolic leaf extract inhibited C. capsici growth less (72.60 ± 3.22% and 48.65 ± 4.6%) than the ethanolic extract at 50 and 100 °C, respectively (Table 5.8). Heating methanolic stem extract to 100°C did not modify its growth inhibition, which was 64.60 ± 1.42% and 60.15 ± 0.78% at 50°C and 100°C, respectively (Fig. 10).

Heating an ethanolic leaf extract of A. sessilis at 50°C inhibited C. capsici growth by 95.42 ± 0.69%, whereas heating at 100°C inhibited the fungus growth by 78.25 ± 2.49%. Heating the ethanolic and methanolic extracts of A. sessilis stem had a paradoxical impact; growth inhibition of C. capsici was observed to be higher when the extracts were heated at

100 °C compared to 50 °C. The growth inhibition was 87.12 ± 1.47% and 90.80 ± 1.61%, respectively, using the ethanolic stem extract of A. sessilis, heated at 50 and 100 °C (Fig. 11).

Heating methanolic extract of A. indica to 50°C & 100°C inhibited C. capsici growth by 57.42 ± 1.18% and 77.96 ± 0.59%, respectively. A similar result was seen in an ethanolic leaf extract of P. paniculata after heating at 50°C and 100°C. At 50°C and 100°C, C. capsici showed 84.50 ±1.24% and 92.75 ±2.28% inhibition, respectively (Fig. 12).

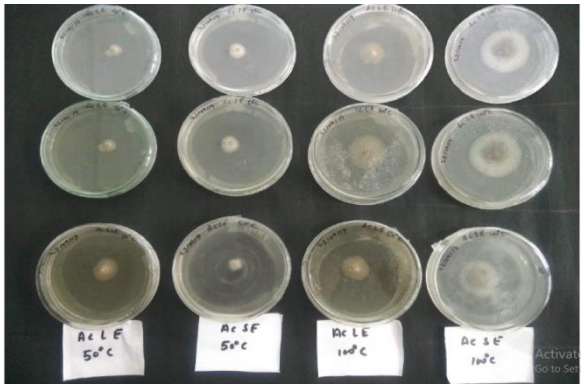


FIG. 10 HEAT TREATMENT (50, 100 °C) OF ETHANOLICEXTRACT OF A. INDICIA AND ITS EFFECTON RADIAL GROWTH OF C. CAPSICI

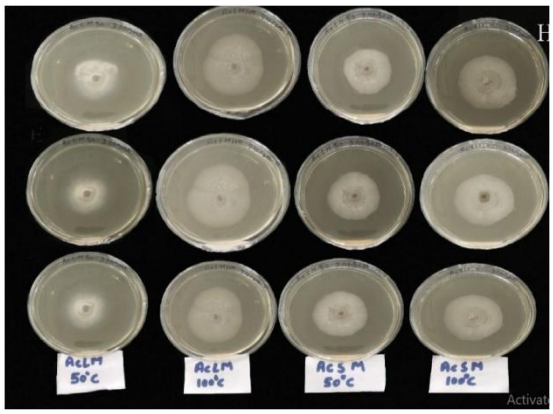


FIG. 11 HEAT TREATMENT (50, 100 °C) OF METHANOLICEXTRACT OF A. INDICA AND ITS EFFECT ON RADIAL GROWTHOF C. CAPSICI

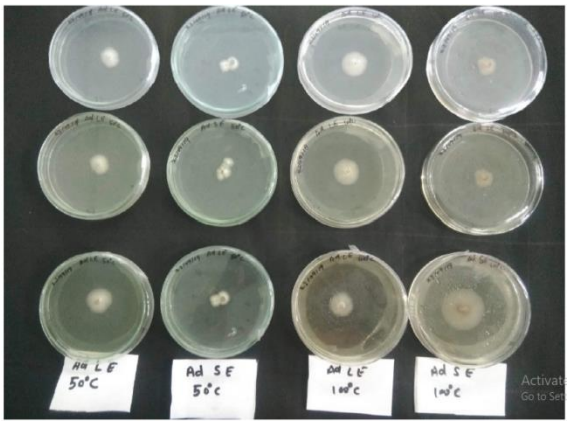


FIG. 12 HEAT TREATMENT (50, 100 °C) OF ETHANOLICEXTRACT OF A. VASICA AND ITSEFFECT ON RADIAL GROWTH OF C. CAPSICI

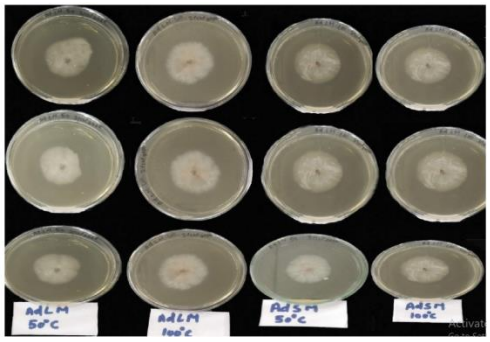


FIG. 13 HEAT TREATMENT (50, 100 °C) OF METHANOLICEXTRACT OF A. VASICA AND ITS EFFECTON RADIAL GROWTH OF C. CAPSICI

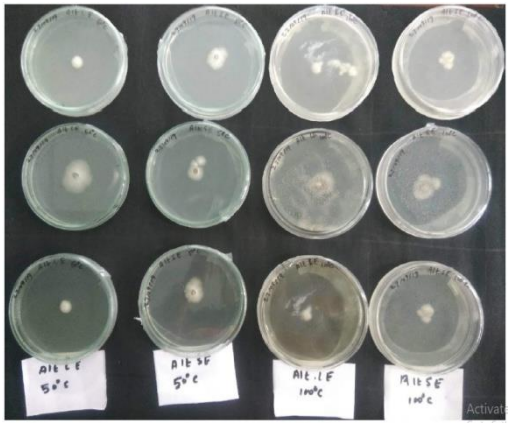


FIG. 14 HEAT TREATMENT (50, 100 °C) OF ETHANOLIC EXTRACTOF A. SESSILIS AND ITS EFFECTON RADIAL GROWTHOF C. CAPSICI

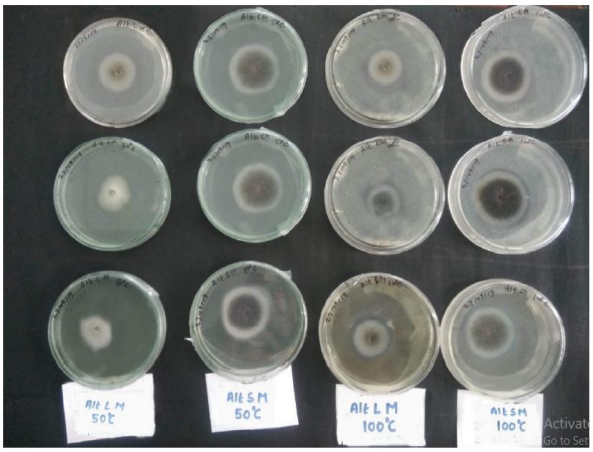


FIG. 15 HEAT TREATMENT (50, 100 °C) OF METHANOLICEXTRACT OF A. SESSILIS AND ITSEFFECT ON RADIAL GROWTH OF C. CAPSICI

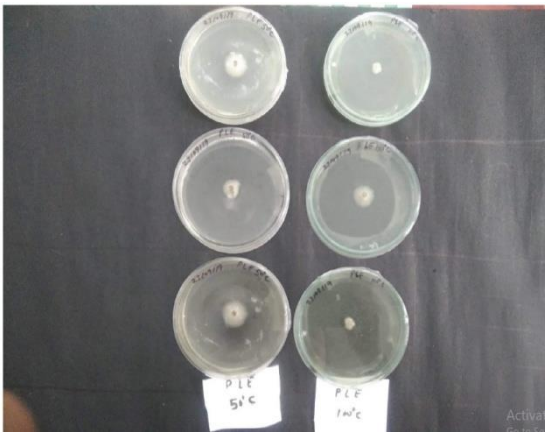
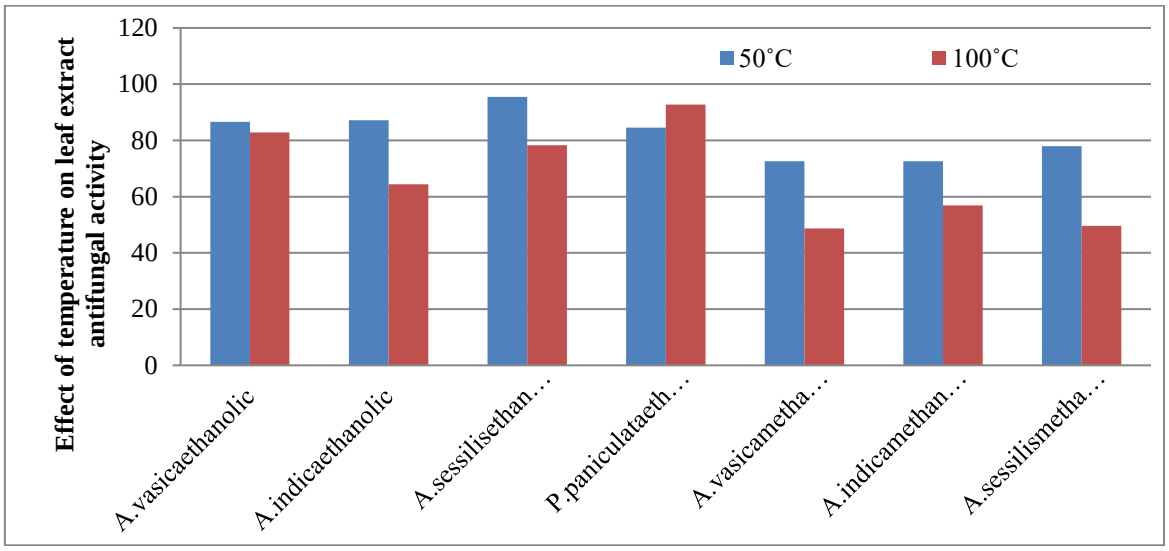


FIG. 16 HEAT TREATMENT (50, 100 °C) OF ETHANOLICEXTRACT OF P. PANICULATA AND ITS EFFECTON RADIAL GROWTH OF C. CAPSICI



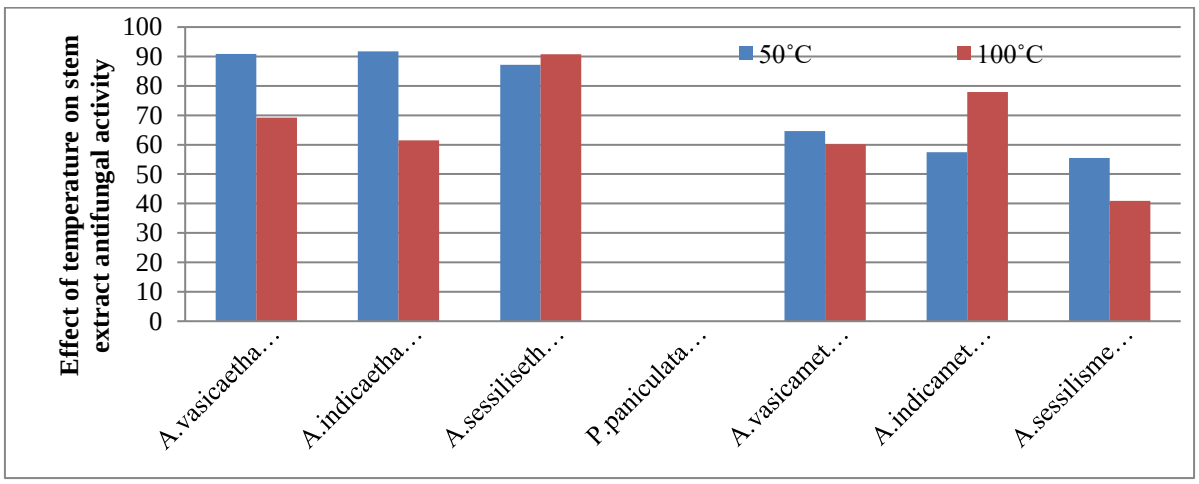


FIG. 17 EFFECT OF TEMPERATURE ON EXTRACT ACTIVITY AT 50 AND 100 °C. VARTICAL BARS REPRESENT ERROR BAR OF MEAN

PROTEOLYTIC DEGRADATION OF EXTRACT

Table 2 compares the effects of trypsin, a proteolytic enzyme, on several plant extracts. The antifungal activity of ethanolic & methanolic (leaf & stem) extracts of A. indica was increased following trypsin treatment as compared to untreated trypsin extract. It was

decreased from 91.26 ± 1.88% and 82.19 ± 3.03% to 58.12 ± 3.74% and 48.90 ± 3.04% in ethanolic and methanolic leaf extracts, respectively. The ethanolic & methanolic stem extracts inhibited C. capsici growth by 94.28 ±0.18%, 73.08 ± 1.19%, 57.76 ± 1.13%, and 49.90 ± 2.13%, respectively.

Similarly, trypsin-treated ethanolic and methanolic extracts of A. sessilis, A. vasica, P. paniculata, & T. bellirica showed a reduction in C. capsici growth inhibition. The ethanolic leaf extracts of A. sessilis, A. vasica, & P. paniculata reduced C. capsici growth inhibition from 86.96 ±2.92%, 93.65 ±0.17%, 88.22 ±2.54%, and 69.09 ±3.81% to 68.11 ± 1.00%, 65.00 ± 1.26%, and 53.35 ± 1.15%, respectively. The methanolicleaf extract of A. vasica had noeffect on C. capsici inhibitory activities. A similar result was seen in both untreated and trypsin-treated methanolic extracts of A. vasica. P. paniculata extract caused an increase in inhibition in C. capsici.

In the case of ethanolic and methanolic stem extractsof A. sessilis, A.vasica, & P. paniculata, trypsin extract reduced growth inhibition in C. capsici. Ethanolic leaf extract of M. parvifolia increased C. capsici growth inhibition by 73.12 ± 0.75% compared to untreated trypsin extract (41.40 ± 2.97%).

TABLE 2 PROTEOLYTIC DEGRADATION OF EXTRACT AND RADIAL GROWTH OF FUNGUS.

EXTRACTS	**ETHANOLIC**		**METHANOLIC**	
	LEAF	**STEM**	**LEAF**	**STEM**
A.indica	58.12±3.74^{c}	57.76±1.13^{b}	48.90±3.04^{b}	49.90±2.13^{cd}
A.vasica	65.00±1.26^{ab}	58.51±00.77^{b}	70.97±0.56^{a}	49.71±0.87^{cd}
A.sessilis	68.11±1.00^{a}	55.02±2.44^{b}	44.95±0.44^{b}	45.11±3.34^{d}
M.parvifolia	73.12±0.75^{a}	77.57±1.15^{a}	48.20±0.68^{b}	61.00±0.74^{b}
P.paniculata	53.35±1.15^{c}	41.13±1.38^{c}	50.92±0.82^{b}	51.63±1.23^{c}
T.bellirica	65.84±3.60^{ab}	70.48±2.89^{a}	-	75.82±2.05^{a}

Each value is given as mean of triplicates, & columns with same alphabetical letters do not differ substantially ($p < 0.05$). - exhibits no inhibition of radial development.

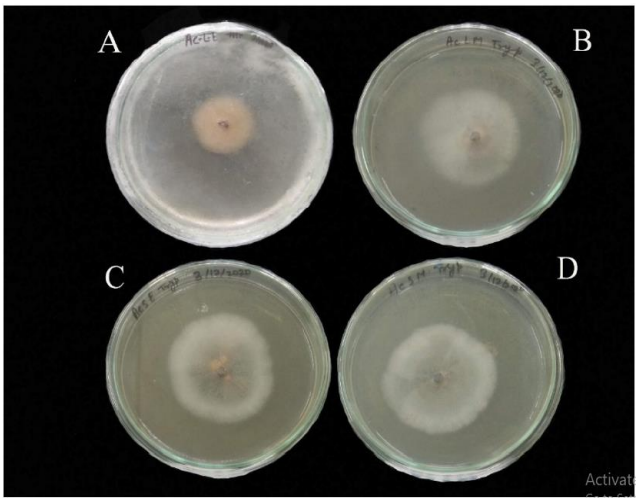


FIG. 18 EFFECT OF A. INDICA EXTRACT AFTER PROTEOLYTIC DEGRADATION ON RADIAL GROWTH OF C. CAPSICI. WHERE ETHANOLIC LEAF (A) METHANOLIC LEAF (B) ETHANOLIC STEM (C) METHANOLIC STEM EXTRACT (D)

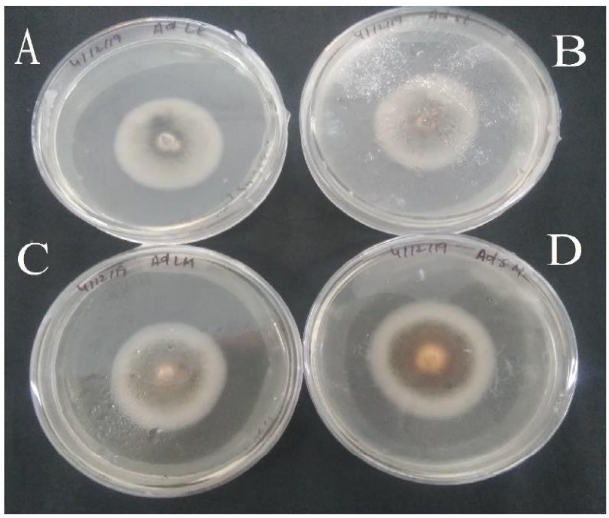


FIG. 19 EFFECT OF A. VASICA EXTRACT AFTER PROTEOLYTIC DEGRADATION ON RADIAL GROWTH OF C. CAPSICI. WHERE ETHANOLIC LEAF (A) ETHANOLIC STEM (B) METHANOLIC LEAF (C) METHANOLIC STEM EXTRACT (D)

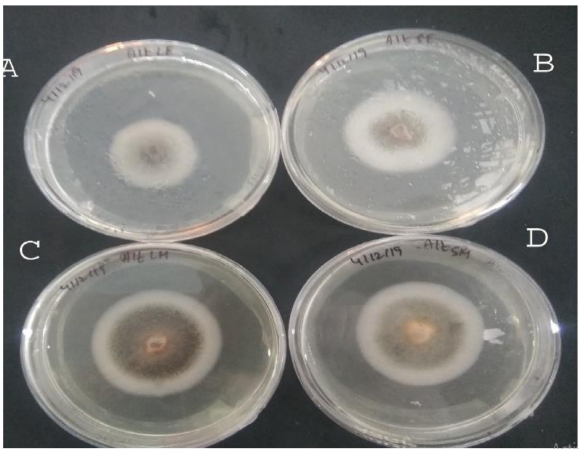


FIG. 20 EFFECT OF A. SESSILIS EXTRACT AFTER PROTEOLYTIC DEGRADATION ON RADIAL GROWTH OF C. CAPSICI. WHERE ETHANOLIC LEAF (A) ETHANOLIC STEM (B) METHANOLIC LEAF (C) METHANOLIC STEM EXTRACT (D)

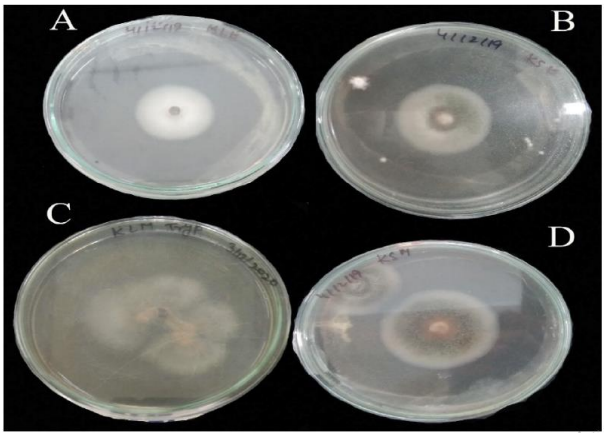


FIG. 21 EFFECT OF M. PARVIFOLIA EXTRACT AFTER PROTEOLYTIC DEGRADATION ON RADIAL GROWTH OF C. CAPSICI. WHERE ETHANOLIC LEAF (A) ETHANOLIC STEM (B) METHANOLIC LEAF (C) METHANOLIC STEM EXTRACT (D)

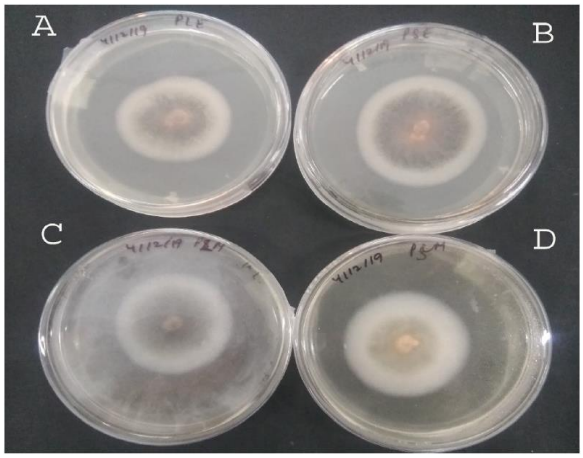


FIG. 22 EFFECT OF P. PANICULATA EXTRACT AFTER PROTEOLYTIC DEGRADATION ON RADIAL NGROWTH OF C. CAPSICI. WHERE ETHANOLIC LEAF (A) ETHANOLIC STEM (B) METHANOLIC LEAF (C) METHANOLIC STEM EXTRACT (D)

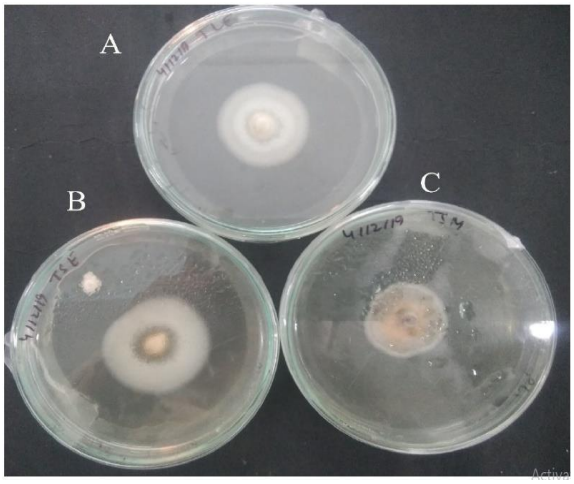


FIG. 22 EFFECT OF T. BELLIRICA EXTRACT AFTER PROTEOLYTIC DEGRADATION ON RADIAL GROWTH OF C. CAPSICI. WHERE ETHANOLIC LEAF (A) ETHANOLIC STEM (B) METHANOLIC STEM EXTRACT (C)

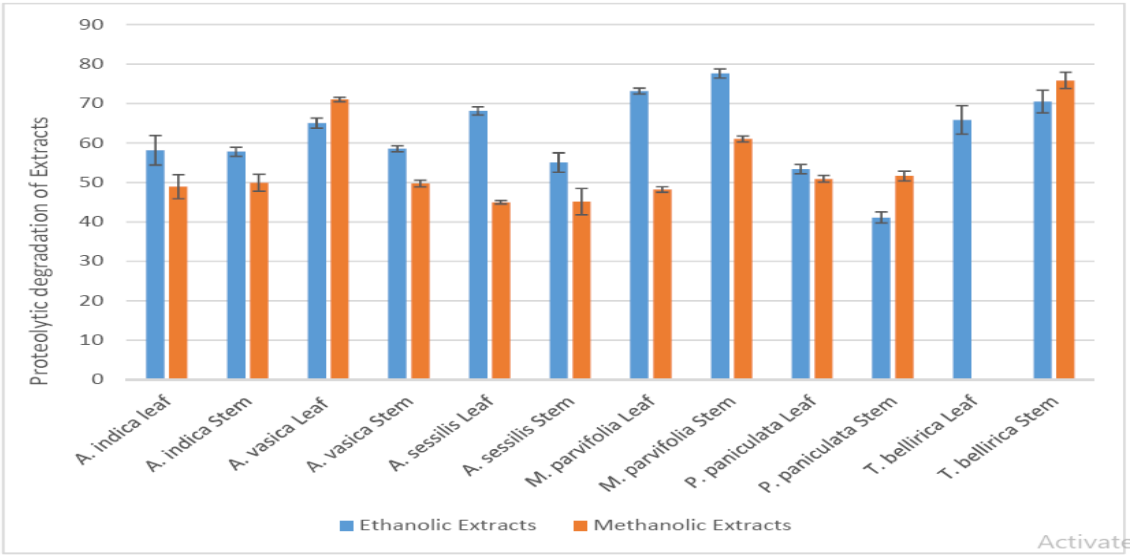


FIG. 23 EXTRACTS PROTEOLYTIC DEGRADATION EFFECT ON ANTIFUNGAL ACTIVITY. VARTICAL BARS REPRESENT ERROR BAR OF MEAN

5. CONCLUSIONS

Chilli is a ubiquitous spice, which is cultivated in every state of India, and quality of chilli varies fromstate to state. Global consumption of chilli is approximately 6.2 million tons which makes about 90 percent of the total production of India. Presently, India is one of core suppliers of red chilli in international market (25%) followed by China (24%) and has become the world's largestproducer and exporter ofchili to USA, Canada,UK, Vietnam, Germany, East, and South Asia, and many other countries around the world. Chilli has been accepted as the prime constituent of various cuisines in tropical and subtropical countries.

The extracts of A.indica and A.vasica showed reduced while Asessilis ethanolic (leaf) & methanolic (leaf and stem) extracts and P. peniculata leaf extract showed increased antifungal activity at both 50 °C and 100 °C.

The antifungal activity of ethanolic & methanolic (leaf & stem) extract of A. indica, A. sessilis, A. vasica, P. peniculata and T. bellirica were more effective with trypsin treatment and reduced the growth activity of C. capsici than nontrypsin treated extract. On the contrary, ethanolic leaf extractof M. parvifolia were found to increase growth of C. capsici compare to non-trypsin treated extract.

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