CHAPTER-6

6.In vitro efficacy of various botanicals against *Alternaria burnsii* and *Fusarium oxysporum* on PDA media.

6.1 Introduction

The current study effort was conducted on sixteen native plants in the laboratory of Atmiya University, Rajkot, to evaluate the antifungal activity on the PDA medium. Native plants have been selected throughout the neighboring regions based on considerations like their ease of access in large quantities and lack of significant financial worth, as well as the existence of antifungal characteristics based on research or conventional wisdom. The chosen botanicals had a good climate adaptation and had become known to the locals for their therapeutic benefits.

6.2 Methods

6.2.1 Collection of native plants from Rajkot City

The leaves of sixteen different plants (Table 5.1) were collected in the plastic bag from the local area of Rajkot city during 2020-2021 to evaluate the antifungal activity of phytoextract against *Alternaria burnsii* and *F. oxysporum* causing major plant in cumin known as cumin blight and cumin wilt respectively.

Figure 6.1: Collection of samples from the local area of Rajkot City

Tr. No.	Common name	English name	Botanical Name	Plant part used
1.	Shitafal	Custard Apple	*Annona reticulata*	Leaves
2.	Satavari	Shatavari	*Asparagus recemosus*	Leaves
3.	Bhringraj	False daisy	*Eclipta prostrata*	Leaves
4.	Ardusi	Adulsa	*Adhatoda vasica*	Leaves
5.	Aleo vera	true aloe	*Aloe barbadensis*	Leaves
6.	Guava tree	Guava tree	*Psidium guajava*	Leaves
7.	Neem	Neem	*Azadirachta indica*	Leaves
8.	Drumstick	Drumstick	*Moringa oleifera*	Leaves
9.	Karanj	Indian beech	*Millettia pinnata*	Leaves
10.	Mint	Mint	*Genus Mentha*	Leaves
11.	Jetropha	Jatropha	*Jatropha curcas*	Leaves
12.	Akdo	Madar	*Calotropis gigantea*	Leaves
13.	Barmasi	Vinca rosea	*Catharanthus trichophyllus*	Leaves
14.	Borsali	bullet wood	*Mimuspos elengi*	Leaves
15.	Tulsi	Holy Basil	*Ocimum tenuiflorum*	Leaves
16.	Nagarvel	Betel leaf	*Piper betle*	Leaves

Table 6.1: Details of plants used to evaluate the antifungal activity against pathogens

6.2.2 Procedure for preparation of phytoextracts

Fresh leaves from a variety of plants were collected. The leaves were carefully washed and allowed air dry. 10gm samples of the plants mentioned earlier were taken. The freshly picked leaves were submerged in 0.1%$HgCl_2$ for around 30 seconds to sterilize the surface. The leaves were then washed using sterile distilled water. The laminar airflow was used during the procedure to keep everything aseptic. 10 percent w/v plant leaves have been crushed with clean water that was distilled in a sterile pestle and mortar. To precipitate debris at the bottom, the extracts were rotated at 2500 rpm for ten minutes in a table-top centrifugation. The supernatant was subsequently utilized for additional research.

6.2.3 Using the poison food procedure to assess the antifungal activity of medicinal plant preparations.

One milliliter of phytoextract was added to 20 milliliters of sterilized dextrose agar from potato peels at different concentrations of 5%, 10%, and 15% from each stock solution. The Petri plate's center involved a disc of mycelial growth with a diameter of 5 mm. The plate without phytoextract was used as a control. Plates were maintained at 27 °C. Three of the five samples that were kept for investigation for each treatment were selected. After incubating for 7 days, the radial expansion of the mycelium was determined.

6.2.4 Fungal strain

Pure cultures of *Fusarium Oxysporum* & *Alternaria burnsii* were collected from the Plant pathology department of Agriculture University, Junagadh. Cultivation & Identification of *Fusarium Oxysporum* & *Alternaria burnsii* were carried out on a PDA medium in the research laboratory of Atmiya University Campus, Rajkot.

6.2.5 Calculation Formula and Statistical Analysis

The investigation was carried out three times, and equations were made using the mean of the three readings. Utilizing the mean colony diameter, the proportion of inhibition was determined using a method proposed by Vincent in 1947.

$$I = \frac{C - T}{C} X100$$

For this calculation, I stand for % inhibition, C represents the colony's diameter of the control plate, and T for *Fusarium oxysporum's* radial growth when phytoextracts are present.

R-language 4.1.1 was used to undertake a statistical evaluation of the data in this experiment. The statistically significant distinctions between the outcomes of every study were ascertained using a one-way analysis of variance (Analysis of Variance) having a significance level of p 0.001 and Tukey's Post Hoc testing using a value of p 0.05.

6.3 Results

6.3.1 Growth inhibition of *A. burnsii* at various concentrations of phytoextract extracted in different solvents at nine days of incubation at 28 ± 2º C

6.3.1.1 In vitro efficacy of phytoextract extracted in water at different concentrations

Treatments	PGI at 5% concentration/Replication			Mean PGI (%)
	R1	R2	R3	
Betel leaf	48.19 (55.55)	45.65 (51.13)	46.84 (53.21)	46.89 (53.30)
Custard apple	46.27 (52.22)	45.69 (51.21)	47.91 (55.07)	46.62 (52.83)
Shatavari	32.83 (29.40)	31.61 (27.46)	28.13 (22.22)	30.86 (26.31)
Bhringraj	26.37 (19.73)	30.34 (25.52)	31.81 (27.78)	29.51 (24.26)
Malabar Nut	50.12 (58.88)	50.92 (60.25)	50.71 (59.90)	50.58 (59.68)
Neem	51.66 (61.51)	52.55 (63.02)	51.23 (60.78)	51.81 (61.78)
Aloe vera	40.83 (42.75)	41.35 (43.64)	41.85 (44.51)	41.34 (43.64)
Diesel plant	36.45 (35.30)	35.75 (34.13)	34.91 (32.75)	35.70 (34.06)
Indian beech	43.78 (47.86)	41.55 (44.00)	42.45 (45.55)	42.59 (45.80)
Mint	39.27 (40.06)	41.52 (43.93)	40.34 (41.90)	40.38 (41.97)
Jetropha	29.304 (23.95)	30.051 (25.07)	31.664 (27.55)	30.34 (25.52)
Guava tree	32.548 (28.94)	33.578 (30.58)	35.028 (32.94)	33.72 (30.81)
Sodom apple	42.431 (45.52)	44.153 (48.52)	43.573 (47.51)	43.39 (47.18)
Vinca rosea	44.179 (48.56)	43.420 (47.51)	45.579 (51.01)	44.39 (48.94)
Bullet wood	51.283 (60.87)	51.557 (61.34)	50.554 (59.63)	19.00 (10.60)
Holy basil	42.450 (45.55)	44.593 (49.28)	43.707 (47.74)	43.58 (47.53)
S.Em				0.75
C.D.at 5%				2.17
C.V.				3.15

Table 6.2: In vitro efficacy of 5% phytoextract extracted in water against *Alternaria burnsii* on PDA media

Note: The data are retransformed inside the brackets, whereas the data outside the brackets are arcsine transformed.

Treatments	PGI at 10% concentration/Replication			Mean PGI (%)
	R1	R2	R3	
Betel leaf	50.35 (59.28)	49.47 (56.52)	51.10 (57.77)	50.31 (59.21)
Custard apple	47.55 (54.44)	48.74 (31.93)	48.84 (56.52)	48.38 (55.89)
Shatavari	34.96 (32.83)	34.40 (31.92)	31.46 (31.93)	33.61 (30.64)
Bhringraj	28.94 (23.42)	34.40 (33.92)	34.97 (31.92)	32.77 (29.30)
Malabar Nut	30.27 (25.42)	35.62 (33.92)	36.18 (33.92)	32.77 (29.30)
Neem	53.70 (64.95)	54.65 (66.53)	52.94 (66.53)	53.77 (65.06)
Aloe vera	43.21 (46.88)	42.45 (45.55)	40.20 (45.55)	41.96 (44.70)
Diesel plant	37.76 (37.50)	38.38 (38.55)	37.33 (38.55)	37.83 (37.61)
Indian beech	46.33 (52.33)	45.07 (50.12)	45.92 (50.12)	45.78 (51.36)
Mint	41.63 (44.13)	41.91 (44.62)	40.80 (44.62)	41.45 (43.82)
Jetropha	31.81 (27.78)	33.75 (30.86)	35.39 (30.86)	33.65 (30.71)
Guava tree	34.34 (31.82)	35.70 (34.06)	36.41 (34.06)	35.49 (33.71)
Sodom apple	44.02 (48.30)	45.74 (51.30)	45.00 (51.30)	44.92 (49.87)
Vinca rosea	46.01 (51.77)	44.82 (49.70)	46.66 (49.70)	45.84 (51.46)
Bullet wood	52.21 (62.45)	52.90 (63.62)	53.80 (63.62)	19.00 (10.60)
Holy basil	44.14 (48.51)	46.45 (52.53)	45.42 (52.53)	45.34 (50.59)
S. Em±				0.89
C.D. at 5%				2.58
C.V.%				3.66

Table: 6.3 In vitro efficacy of 10 % phytoextract extracted in water against *Alternaria burnsii* on PDA media

Note: The data are retransformed inside the brackets, whereas the data outside the brackets are arcsine transformed.

Treatment	PGI at 15% concentration/Replication			Mean PGI (%)
	R1	R2	R3	
Betel leaf	52.12 (62.31)	52.87 (63.57)	54.27 (65.91)	53.09 (63.94)
Custard apple	49.04 (57.03)	51.11 (60.58)	50.63 (59.67)	50.26 (59.13)
Shatavari	35.46 (33.66)	37.26 (36.66)	35.95 (34.46)	36.23 (34.93)
Bhringraj	35.26 (33.33)	41.81 (44.44)	38.86 (39.37)	38.65 (39.00)
Malabar Nut	52.89 (63.61)	53.80 (65.13)	53.10 (63.95)	53.27 (64.23)
Neem	55.83 (68.45)	54.79 (66.75)	54.57 (66.40)	55.06 (67.21)
Aloe vera	46.11 (51.94)	48.19 (55.55)	46.83 (53.20)	47.05 (53.57)
Diesel plant	39.97 (41.27)	40.78 (42.66)	41.23 (43.33)	40.66 (42.46)
Indian beech	51.55 (61.33)	50.56 (59.64)	50.08 (58.82)	50.73 (59.94)
Mint	45.95 (51.66)	46.29 (52.26)	45.56 (50.97)	45.94 (51.64)
Jatropha	34.34 (31.82)	35.61 (33.91)	36.52 (35.42)	35.49 (33.71)
Guava tree	37.25 (36.64)	38.26 (38.34)	39.38 (40.26)	38.30 (38.41)
Sodom apple	45.27 (50.47)	46.73 (53.03)	47.39 (54.17)	46.47 (52.56)
Vinca rosea	47.33 (54.06)	47.70 (54.71)	48.59 (56.25)	47.88 (55.01)
Bullet wood	53.80 (65.13)	55.22 (67.46)	55.67 (68.20)	19.00 (10.60)
Holy basil	46.10 (51.92)	48.55 (56.18)	46.79 (53.13)	47.15 (53.75)
S. Em				0.69
C.D.at 5%				2.01
C.V.				2.61

Table 6.4: In vitro efficacy of 15% phytoextract extracted in water against *Alternaria burnsii* on PDA media

Note: The data are retransformed inside the brackets, whereas the data outside the brackets are arcsine transformed.

Treatments	Mean Concentration (%)/percent inhibition*			Mean % PGI
	5%	10%	15%	
Betel leaf	46.89 (53.30)	50.31 (59.21)	53.09 (63.94)	50.10 (58.85)
Custard apple	46.62 (52.83)	48.38 (55.89)	50.26 (59.13)	48.42 (55.95)
Shatavari	30.86 (26.31)	33.61 (30.64)	36.23 (34.93)	33.58 (30.60)
Bhringraj	29.51 (24.26)	32.77 (29.30)	38.65 (39.00)	35.00 (32.90)
Malabar Nut	50.58 (59.68)	32.77 (29.30)	53.27 (64.23)	51.89 (61.91)
Neem	51.81 (61.78)	53.77 (65.06)	55.06 (67.21)	53.54 (64.69)
Aloe vera	41.34 (43.64)	41.96 (44.70)	47.05 (53.57)	43.45 (47.29)
Diesel plant	35.70 (34.06)	37.83 (37.61)	40.66 (42.46)	38.06 (38.01)
Indian beech	42.59 (45.80)	45.78 (51.36)	50.73 (59.94)	46.36 (52.38)
Mint	40.38 (41.97)	41.45 (43.82)	45.94 (51.64)	42.59 (45.79)
Jetropha	30.34 (25.52)	33.65 (30.71)	35.49 (33.71)	33.17 (29.93)
Guava tree	33.72 (30.81)	35.49 (33.71)	38.30 (38.41)	35.84 (34.28)
Sodom apple	43.39 (47.18)	44.92 (49.87)	46.47 (52.56)	44.92 (49.78)
Vinca rosea	44.39 (48.94)	45.84 (51.46)	47.88 (55.01)	46.04 (51.85)
Bullet wood	19.00 (10.60)	19.00 (10.60)	19.00 (10.60)	19.00 (10.60)
Holy basil	43.58 (47.53)	45.34 (50.59)	47.15 (53.75)	45.35 (50.62)
S.Em				1.55
C.D.at 5%				4.46
C.V.				6.13

* Mean of three replications

Table 6.5: Efficacy of phytoextract extracted in water at different concentrations against *Alternaria burnsii* on PDA media

Note: The data are retransformed inside the brackets, whereas the data outside the brackets are arcsine transformed.

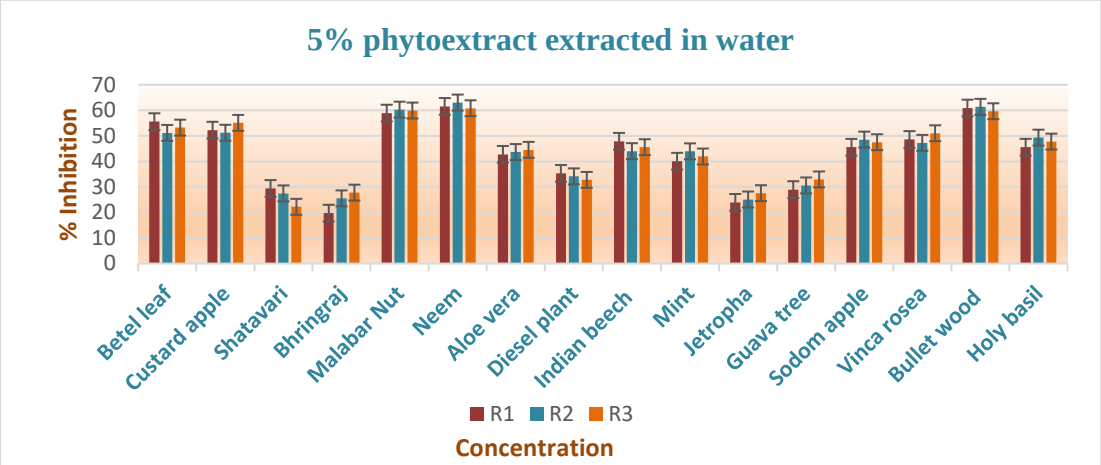


Figure 6.2: Antifungal activity assay of 5% phytoextracts in water against *A. burnsii*

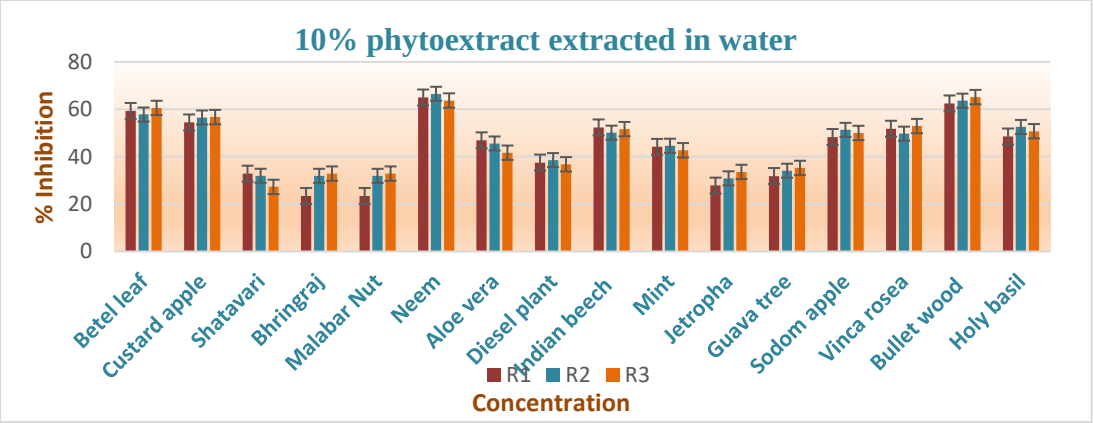


Figure 6.3: Antifungal activity assay of 10% phytoextracts in water against *A. burnsii*

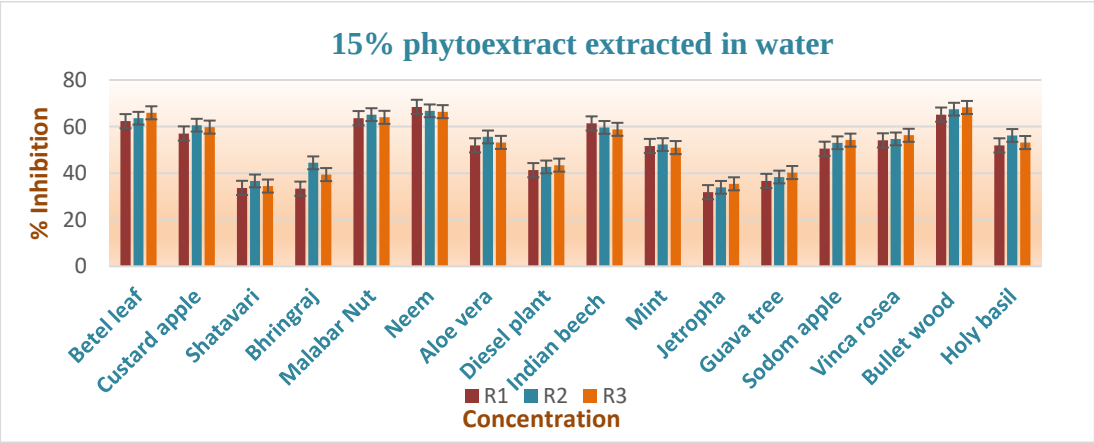


Figure 6.4: Antifungal activity assay of 15% phytoextracts in water against *A. burnsii*

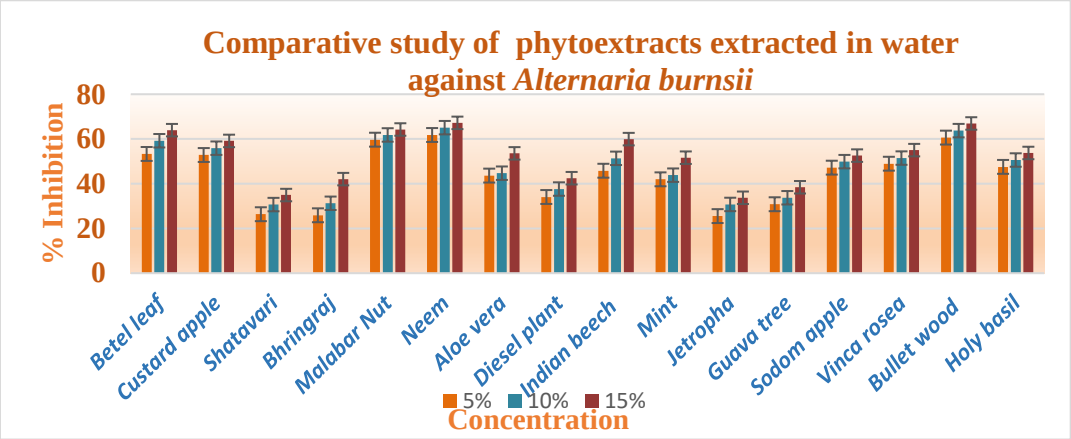


Figure 6.5: Efficacy of phytoextract extracted in water at different concentrations against *Alternaria burnsii*

The data Table (Table:6.2 to Table: 6.5) revealed the in vitro evaluation of 5%, 10%, and 15% phytoextract extracted in water against *Alternaria burnsii*

The extract of Neem had the highest degree of mycelial inhibition of growth at a concentration of 5% (Figure 6.2), next to bullet wood extract (60.61%). At the same concentration, the extract of Betel leaf, custard apple, Adulsa, Aloe vera, Indian beech, Mint, Akdo, Vinca rosea, and holy basil inhibited the mycelial growth in the range of 41.96%-59.68%, while lowest inhibition was recorded by Shatavari, Bhringraj, Diseal plant, Jatropha and Guava in range of 25.52% -30.82%.

The two-plant extract that reduced mycelial development the best at a 10% concentration was neem 65.05% and bullet wood 63.73% (Figure 6.3). Adulsa gave 61.8% inhibition. The effectiveness of the other examined extracts of betel leaf, custard apple, Indian beech, Vinca rosea, and holy basil varied from 49.86% to 59.21%. The extract was made from the leaves of Shatavari, Bhringraj, Diseal plant, Jatropha, & Guava had the lowest effectiveness, ranging from 30.67% to 37.61%.

Neem exhibited a 67.2% inhibition at a concentration of 15% (Figure 6.4), while bullet wood showed a 66.93% inhibition. Adulsa indicated a 64.23% inhibition. The effectiveness of the other tested extracts of Custard apple, Aloe vera, Indian beech, Mint, Akdo, Vinca rosea, and Holy basil ranged from 52.56% to 59.93%. Shatavari (34.83%) and Jatropha (33.71%) had the least amount of inhibition.

6.3.1.2 In vitro efficacy of phytoextract extracted in acetone at different concentrations

Treatment	PGI at 5% concentration/Replication			Mean PGI (%)
	R1	R2	R3	
Betel leaf	54.43 (66.16)	52.65 (63.20)	53.25 (64.20)	53.45 (64.53)
Custard apple	50.58 (59.67)	52.59 (63.10)	50.98 (60.36)	51.39 (61.05)
Shatavari	37.07 (36.34)	37.54 (37.13)	36.44 (35.28)	37.02 (36.25)
Bhringraj	32.80 (29.35)	31.51 (27.32)	32.07 (28.20)	32.13 (28.29)
Malabar Nut	52.57 (63.06)	51.89 (61.92)	53.21 (64.13)	52.56 (63.04)
Neem	54.50 (66.28)	53.94 (65.32)	55.21 (67.45)	54.56 (66.37)
Aloe vera	44.23 (48.65)	44.50 (49.13)	45.98 (51.71)	44.90 (49.83)
Diesel plant	36.45 (35.30)	35.74 (34.13)	34.91 (32.75)	35.70 (34.06)
Indian beech	49.05 (57.05)	49.40 (57.65)	50.52 (59.57)	49.66 (58.10)
Mint	46.61 (52.82)	46.73 (53.02)	47.99 (55.21)	47.11 (53.69)
Jetropha	37.04 (36.28)	38.39 (38.56)	39.69 (40.78)	38.37 (38.54)
Guava tree	37.63 (37.27)	37.71 (37.42)	39.08 (39.74)	38.14 (38.15)
Sodom apple	48.51 (56.12)	46.70 (52.97)	47.38 (54.15)	47.54 (54.42)
Vinca rosea	48.11 (55.42)	48.56 (56.20)	47.46 (54.20)	48.05 (55.31)
Bullet wood	53.27 (64.24)	53.88 (65.25)	52.55 (63.03)	19.00 (10.60)
Holy basil	46.05 (51.84)	46.71 (52.98)	47.05 (53.57)	46.61 (52.80)
S.Em				0.46
C.D.at 5%				1.34
C.V.				1.77

Table 6.6: In vitro efficacy of 5% phytoextract extracted in acetone against *Alternaria burnsii* on PDA media

Note: The data are retransformed inside the brackets, whereas the data outside the brackets are arcsine transformed.

Treatment	**PGI at 10% concentration/Replication**			**Mean PGI (%)**
	R1	**R2**	**R3**	
Betel leaf	56.94 (70.24)	55.78 (68.38)	54.54 (66.35)	55.76 (68.34)
Custard apple	53.78 (65.1)	54.24 (65.85)	51.89 (61.91)	53.31 (64.30)
Shatavari	39.04 (39.67)	39.63 (40.68)	38.05 (37.98)	38.91 (39.45)
Bhringraj	35.64 (33.96)	33.68 (30.76)	34.97 (32.85)	34.77 (32.52)
Malabar Nut	54.11 (65.63)	52.81 (63.46)	55.04 (67.17)	53.99 (65.43)
Neem	55.78 (68.38)	57.38 (70.94)	56.51 (69.56)	56.56 (69.64)
Aloe vera	46.38 (52.41)	46.12 (51.96)	47.76 (54.81)	46.76 (53.06)
Diesel plant	37.76 (37.5)	38.38 (38.55)	37.33 (36.77)	37.83 (37.61)
Indian beech	51.19 (60.73)	51.93 (61.98)	51.72 (61.62)	51.62 (61.45)
Mint	49.33 (57.54)	49.92 (58.54)	50.56 (59.65)	49.94 (58.58)
Jetropha	38.63 (38.97)	39.73 (40.86)	40.98 (43.01)	39.78 (40.95)
Guava tree	40.40 (42.02)	40.98 (43.02)	41.60 (44.08)	41.00 (43.05)
Sodom apple	50.23 (59.07)	51.89 (61.91)	51.31 (60.93)	51.15 (60.64)
Vinca rosea	51.21 (60.75)	51.90 (61.93)	49.81 (58.35)	50.97 (60.35)
Bullet wood	54.47 (66.23)	55.76 (68.35)	56.64 (69.76)	19.00 (10.60)
Holy basil	48.26 (55.67)	49.98 (58.65)	50.43 (59.43)	49.56 (57.93)
S.Em				0.54
C.D.at 5%				1.56
C.V.				1.96

Table 6.7: In vitro efficacy of 10% phytoextract extracted in acetone against *Alternaria burnsii* on PDA media

Note: The data are retransformed inside the brackets, whereas the data outside the brackets are arcsine transformed.

Treatment	PGI at 15% concentration/Replication			Mean PGI (%)
	R1	R2	R3	
Betel leaf	60.74 (76.12)	59.43 (74.13)	57.26 (70.75)	59.15 (73.70)
Custard apple	56.21 (69.07)	55.87 (68.53)	54.95 (67.03)	55.68 (68.22)
Shatavari	41.54 (43.97)	42.24 (45.2)	40.40 (42.02)	41.40 (43.73)
Bhringraj	37.71 (37.42)	38.59 (38.91)	37.14 (36.45)	37.82 (37.59)
Malabar Nut	55.86 (68.51)	53.80 (65.13)	56.61 (69.72)	55.43 (67.80)
Neem	60.14 (75.21)	59.52 (74.27)	60.92 (76.38)	60.20 (75.30)
Aloe vera	48.75 (56.53)	49.12 (57.17)	49.68 (58.13)	49.19 (57.28)
Diesel plant	39.97 (41.27)	40.78 (42.66)	41.23 (43.44)	40.66 (42.46)
Indian beech	53.09 (63.94)	53.86 (65.23)	54.99 (67.1)	53.99 (65.43)
Mint	51.34 (60.98)	51.60 (61.43)	52.45 (62.86)	51.80 (61.76)
Jetropha	41.03 (43.1)	42.15 (45.05)	42.88 (46.31)	42.02 (44.82)
Guava tree	42.95 (46.43)	44.01 (48.27)	43.58 (47.52)	43.52 (47.41)
Sodom apple	52.53 (63)	53.18 (64.08)	53.31 (64.31)	53.01 (63.80)
Vinca rosea	54.3 (66.04)	55.10 (67.27)	53.88 (65.25)	54.45 (66.20)
Bullet wood	58.38 (72.52)	59.95 (74.93)	59.38 (74.06)	19.00 (10.60)
Holy basil	50.54 (59.61)	52.60 (63.12)	51.83 (61.81)	51.66 (61.52)
S.Em				0.51
C.D.at 5%				1.48
C.V.				1.77

Table 6.8: In vitro efficacy of 15% phytoextract extracted in acetone against *Alternaria burnsii* on PDA media

Note: The data are retransformed inside the brackets, whereas the data outside the brackets are arcsine transformed.

Treatment	Concentration (%)/ percent inhibition*			Mean PGI (%)
	5%	10%	15%	
Betel leaf	53.45 (64.53)	55.76 (68.34)	59.15 (73.70)	56.11 (68.90)
Custard apple	51.39 (61.05)	53.31 (64.30)	55.68 (68.22)	53.45 (64.54)
Shatavari	37.02 (36.25)	38.91 (39.45)	41.40 (43.73)	39.11 (39.79)
Bhringraj	32.13 (28.29)	34.77 (32.52)	37.82 (37.59)	34.91 (32.74)
Malabar Nut	52.56 (63.04)	53.99 (65.43)	55.43 (67.80)	53.99 (65.43)
Neem	54.56 (66.37)	56.56 (69.64)	60.20 (75.30)	57.10 (70.50)
Aloe vera	44.90 (49.83)	46.76 (53.06)	49.19 (57.28)	46.95 (53.40)
Diesel plant	35.70 (34.06)	37.83 (37.61)	40.66 (42.46)	38.06 (38.01)
Indian beech	49.66 (58.10)	51.62 (61.45)	53.99 (65.43)	51.75 (61.67)
Mint	47.11 (53.69)	49.94 (58.58)	51.80 (61.76)	49.62 (58.02)
Jetropha	38.37 (38.54)	39.78 (40.95)	42.02 (44.82)	40.06 (41.41)
Guava tree	38.14 (38.15)	41.00 (43.05)	43.52 (47.41)	40.88 (42.84)
Sodom apple	47.54 (54.42)	51.15 (60.64)	53.01 (63.80)	50.56 (59.65)
Vinca rosea	48.05 (55.31)	50.97 (60.35)	54.45 (66.20)	51.15 (60.66)
Bullet wood	19.00 (10.60)	19.00 (10.60)	19.00 (10.60)	19.00 (10.60)
Holy basil	46.61 (52.80)	49.56 (57.93)	51.66 (61.52)	49.27 (57.43)
S.Em				1.45
C.D.at 5%				4.81
C.V.				5.23

*Mean of three replicates

Table 6.9: Efficacy of phytoextract extracted in acetone at different concentration against *Alternaria burnsii* on PDA media

Note: The data are retransformed inside the brackets, whereas the data outside the brackets are arcsine transformed.

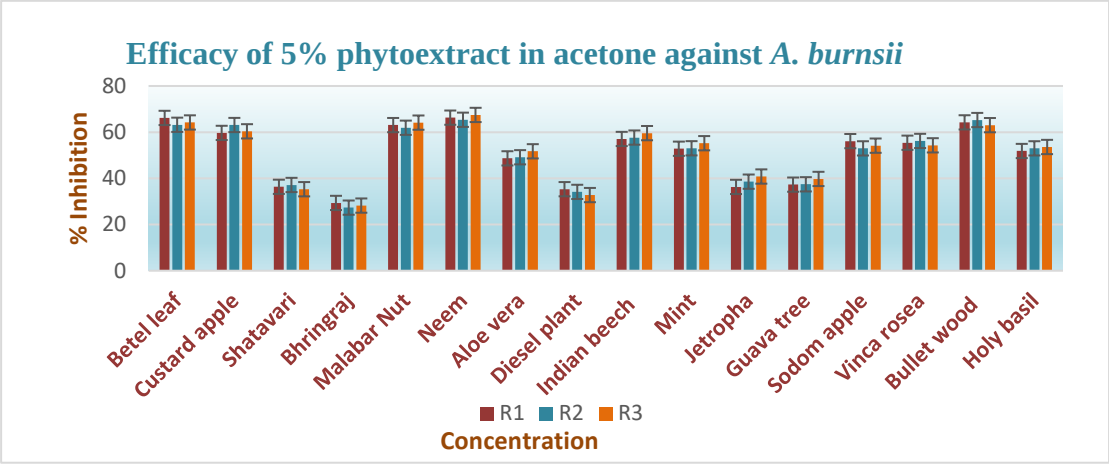


Figure 6.6: Antifungal activity assay of 5% phytoextracts in acetone against *A. burnsii*

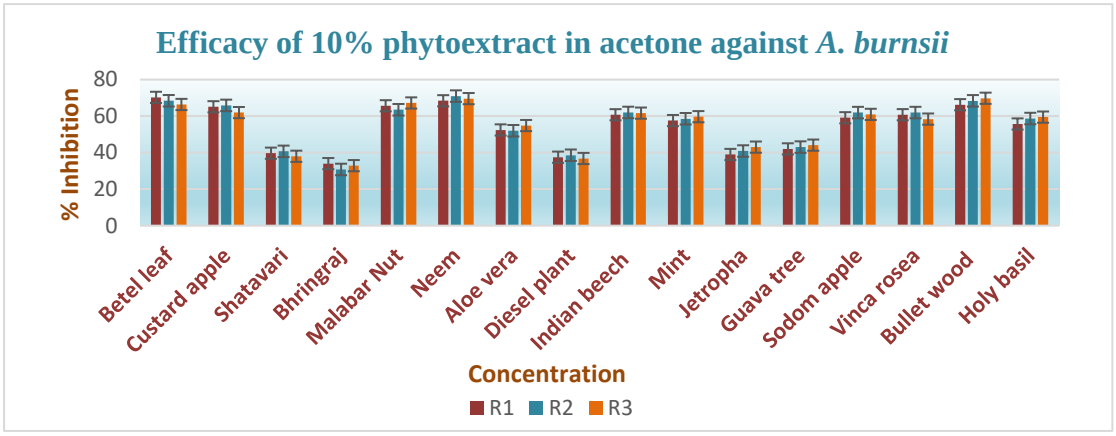


Figure 6.7: Antifungal activity assay of 10 % phytoextracts in acetone against *A. burnsii*

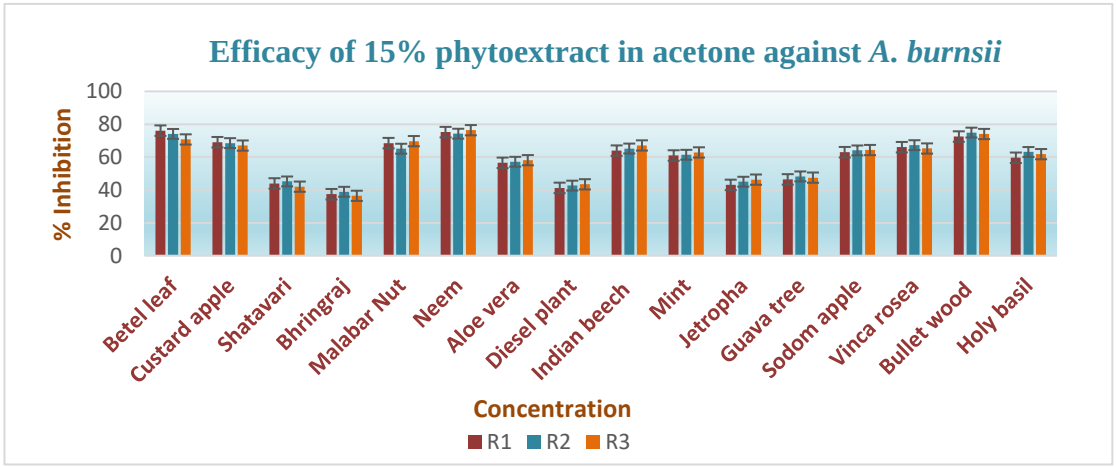


Figure 6.8: Antifungal activity assay of 15% phytoextracts in acetone against *A. burnsii*

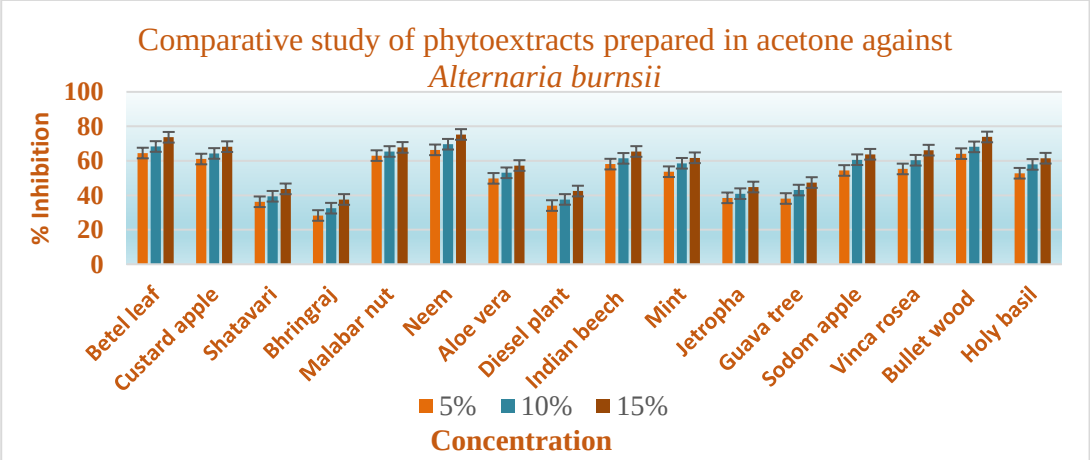


Figure 6.9: Efficacy of phytoextract extracted in acetone at different concentrations against *Alternaria burnsii*

The data Table (Table:5.6 to Table: 5.9) revealed the in vitro evaluation of 5%, 10% and 15% phytoextract extracted in acetone against *Alternaria burnsii*

At 5% extract with acetone (Figure 5.6), the highest inhibition was recorded by Neem (66.37%) and followed by Betel leaf (64.52%) bullet wood (64.17%). The effectiveness of the other tested extracts of Custard apple, Adulsa, Indian beech, Mint Akdo, vinca rosea, and holy basil was in the range of 53.68% to 61.04%. The lowest inhibition was recorded by Bhringraj, Shatavari, Diesel plant, Jatropha, and Guava.

The highest inhibition (Figure 5.7) at 10 % was recorded by Neem (69.63%), Betel leaf (68.32%), and Bullet wood (68.11%). Efficacy in a range of 53.06% - 65.42% was recorded by extract of Custard apple, Adulsa, Aleo vera, Indian beech, Mint, and Holy Basil. The least efficacy was recorded by Shatavai, Bringraj, Diseal plant, Jatropha, and Guava in the range of 32.52% to 37.24%.

At 15% concentration (Figure 5.8), 75.29% inhibition was given by Neem (73.84%), Bullet wood 73.84% and Betel leaf (73.67%). Inhibition in the range of 57.28 – 68.21% was recorded by extract of Custard apple, Adulsa, Aloe vera, Indian beech, Mint, Akdo, Vinca rosea, and Holy basil. The least efficacy was recorded in the range of 37.59%-47.41% by the extract of Shatavari, Bhringraj, Diseal plant, Jatropha, and Guava.

6.3.1.3 In vitro efficacy of phytoextract extracted in cow urine at different concentration

Treatment	PGI at 5% concentration/Replication			Mean PGI (%)
	R1	R2	R3	
Betel leaf	51.23 (60.87)	50.13 (58.91)	49.47 (57.76)	50.30 (59.19)
Custard apple	49.45 (57.77)	50.89 (60.22)	49.90 (58.51)	50.09 (58.84)
Shatavari	35.19 (33.07)	35.72 (34.08)	33.81 (30.97)	34.88 (32.71)
Bhringraj	31.67 (27.54)	30.94 (26.43)	30.86 (26.32)	31.15 (26.76)
Malabar Nut	50.62 (59.76)	50.60 (59.71)	51.86 (61.86)	51.03 (60.45)
Neem	51.79 (61.72)	53.94 (65.36)	53.17 (64.07)	52.97 (63.73)
Aloe vera	42.25 (45.19)	42.59 (45.8)	44.07 (48.37)	42.97 (46.46)
Diesel plant	33.70 (30.83)	33.59 (30.61)	32.35 (28.63)	33.22 (30.02)
Indian beech	46.75 (53.04)	49.40 (57.65)	47.98 (55.2)	48.04 (55.30)
Mint	41.52 (44.06)	42.27 (45.24)	41.00 (43.04)	41.62 (44.12)
Jetropha	30.98 (26.4)	29.42 (24.13)	27.94 (21.96)	29.43 (21.14)
Guava tree	35.19 (33.07)	34.32 (31.8)	33.37 (30.26)	34.27 (31.71)
Sodom apple	44.85 (49.67)	43.54 (47.46)	42.94 (46.41)	43.77 (47.85)
Vinca rosea	43.94 (48.12)	45.17 (50.31)	44.18 (48.57)	44.43 (49.00)
Bullet wood	51.23 (60.87)	50.13 (58.91)	50.12 (58.88)	19.00 (10.60)
Holy basil	42.33 (45.3)	41.50 (43.92)	38.33 (38.46)	40.71 (42.55)
S.Em				0.59
C.D.at 5%				1.72
C.V.				2.43

Table 6.10: In vitro efficacy of 5% phytoextract extracted in cow urine against *Alternaria burnsii* on PDA media

Note: The data are retransformed inside the brackets, whereas the data outside the brackets are arcsine transformed.

Treatment	PGI at 10 % concentration/Replication			Mean PGI (%)
	R1	R2	R3	
Betel leaf	54.50 (66.31)	53.54 (64.68)	52.79 (63.43)	53.62 (64.82)
Custard apple	51.01 (60.53)	52.23 (62.48)	51.89 (61.91)	51.73 (61.65)
Shatavari	36.90 (36.06)	37.28 (36.68)	38.33 (38.46)	37.51 (37.07)
Bhringraj	33.51 (30.57)	31.82 (27.8)	35.66 (33.98)	33.68 (30.76)
Malabar Nut	52.58 (63.05)	51.49 (61.24)	53.32 (64.33)	52.47 (62.88)
Neem	53.89 (65.26)	55.80 (68.41)	55.23 (67.47)	54.97 (67.06)
Aloe vera	43.17 (46.85)	44.85 (49.74)	45.21 (50.36)	44.42 (48.99)
Diesel plant	36.48 (35.27)	38.42 (38.62)	35.04 (32.97)	36.64 (35.61)
Indian beech	48.52 (56.2)	49.21 (57.32)	48.57 (56.22)	48.78 (56.58)
Mint	44.84 (49.74)	45.49 (50.85)	44.23 (48.65)	44.86 (49.75)
Jetropha	32.27 (28.53)	33.06 (29.76)	30.94 (26.43)	32.10 (28.23)
Guava tree	37.72 (37.46)	37.04 (36.28)	38.22 (38.28)	37.67 (37.35)
Sodom apple	47.93 (55.14)	47.30 (54.02)	46.60 (52.8)	47.29 (53.99)
Vinca rosea	47.31 (54.13)	48.40 (55.92)	46.91 (53.33)	47.56 (54.46)
Bullet wood	50.61 (59.86)	52.79 (63.43)	53.44 (64.32)	19.00 (10.60)
Holy basil	44.85 (49.8)	46.53 (52.67)	45.64 (51.13)	45.69 (51.20)
S.Em				0.59
C.D.at 5%				1.71
C.V.				2.29

Table 6.11: In vitro efficacy of 10% phytoextract extracted in cow urine against *Alternaria burnsii* on PDA media

Note: The data are retransformed inside the brackets, whereas the data outside the brackets are arcsine transformed.

Treatment	PGI at 15% concentration/Replication			Mean PGI (%)
	R1	R2	R3	
Betel leaf	56.94 (70.24)	55.78 (68.38)	54.54 (66.35)	55.76 (68.34)
Custard apple	53.78 (65.1)	54.24 (65.85)	51.89 (61.91)	53.31 (64.30)
Shatavari	39.04 (39.67)	39.63 (40.68)	38.05 (37.98)	38.91 (39.45)
Bhringraj	35.64 (33.96)	33.68 (30.76)	34.97 (32.85)	34.77 (32.52)
Malabar Nut	54.11 (65.63)	52.81 (63.46)	55.04 (67.17)	53.99 (65.43)
Neem	55.78 (68.38)	57.38 (70.94)	56.51 (69.56)	56.56 (69.64)
Aloe vera	46.38 (52.41)	46.12 (51.96)	47.76 (54.81)	46.76 (53.06)
Diesel plant	37.76 (37.5)	38.38 (38.55)	37.33 (36.77)	37.83 (37.61)
Indian beech	51.19 (60.73)	51.93 (61.98)	51.72 (61.62)	51.62 (61.45)
Mint	49.33 (57.54)	49.92 (58.54)	50.56 (59.65)	49.94 (58.58)
Jetropha	38.63 (38.97)	39.73 (40.86)	40.98 (43.01)	39.78 (40.95)
Guava tree	40.40 (42.02)	40.98 (43.02)	41.60 (44.08)	41.00 (43.04)
Sodom apple	50.23 (59.07)	51.89 (61.91)	51.31 (60.93)	51.15 (60.64)
Vinca rosea	51.21 (60.75)	51.90 (61.93)	49.81 (58.35)	50.97 (60.35)
Bullet wood	54.47 (66.23)	55.76 (68.35)	56.64 (69.76)	19.00 (10.60)
Holy basil	48.26 (55.67)	49.98 (58.65)	50.43 (59.43)	49.56 (57.93)
S.Em				.54
C.D.at 5%				1.56
C.V.				1.96

6.12: In vitro efficacy of 15 % phytoextract extracted in acetone against *Alternaria burnsii* on PDA media

Note: The data are retransformed inside the brackets, whereas the data outside the brackets are arcsine transformed.

Treatment	Concentration (%)/ percent inhibition*			Mean PGI (%)
	5%	10%	15%	
Betel leaf	50.30 (59.19)	53.62 (64.82)	55.76 (68.34)	53.22 (64.11)
Custard apple	50.09 (58.84)	51.73 (61.65)	53.31 (64.30)	51.71 (61.59)
Shatavari	34.88 (32.71)	37.51 (37.07)	38.91 (39.45)	37.1 (36.41)
Bhringraj	31.15 (26.76)	33.68 (30.76)	34.77 (32.52)	33.2 (30.01)
Malabar Nut	51.03 (60.45)	52.47 (62.88)	53.99 (65.43)	52.49 (62.92)
Neem	52.97 (63.73)	54.97 (67.06)	56.56 (69.64)	54.83 (66.81)
Aloe vera	42.97 (46.46)	44.42 (48.99)	46.76 (53.06)	44.71 (49.50)
Diesel plant	33.22 (30.02)	36.64 (35.61)	37.83 (37.61)	35.89 (34.41)
Indian beech	48.04 (55.30)	48.78 (56.58)	51.62 (61.45)	49.48 (57.77)
Mint	41.62 (44.12)	44.86 (49.75)	49.94 (58.58)	45.47 (50.81)
Jetropha	29.43 (21.14)	32.10 (28.23)	39.78 (40.95)	33.77 (30.10)
Guava tree	34.27 (31.71)	37.67 (37.35)	41.00 (43.04)	37.64 (37.36)
Sodom apple	43.77 (47.85)	47.29 (53.99)	51.15 (60.64)	47.40 (54.16)
Vinca rosea	44.43 (49.00)	47.56 (54.46)	50.97 (60.35)	47.65 (54.60)
Bullet wood	19.00 (10.60)	19.00 (10.60)	19.00 (10.60)	19.00 (10.60)
Holy basil	40.71 (42.55)	45.69 (51.20)	49.56 (57.93)	45.32 (50.56)
S.Em				0.57
C.D.at 5%				1.66
C.V.				2.22

* Mean of three replications

Table 6.13: Efficacy of phytoextract extracted in cow urine at different concentrations against *Alternaria burnsii* on PDA media

Note: The data are retransformed inside the brackets, whereas the data outside the brackets are arcsine transformed.

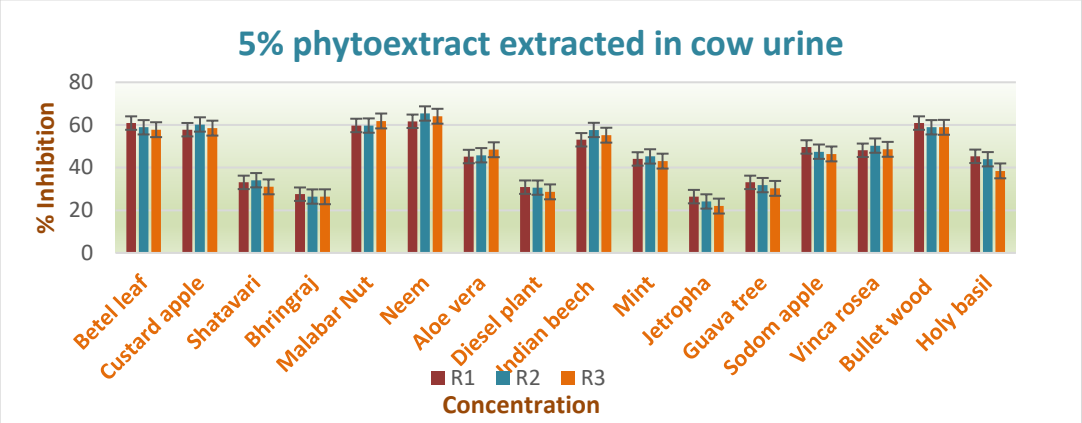


Figure 6.10: Antifungal activity assay of 5% phytoextracts in cow urine against *A. burnsii*

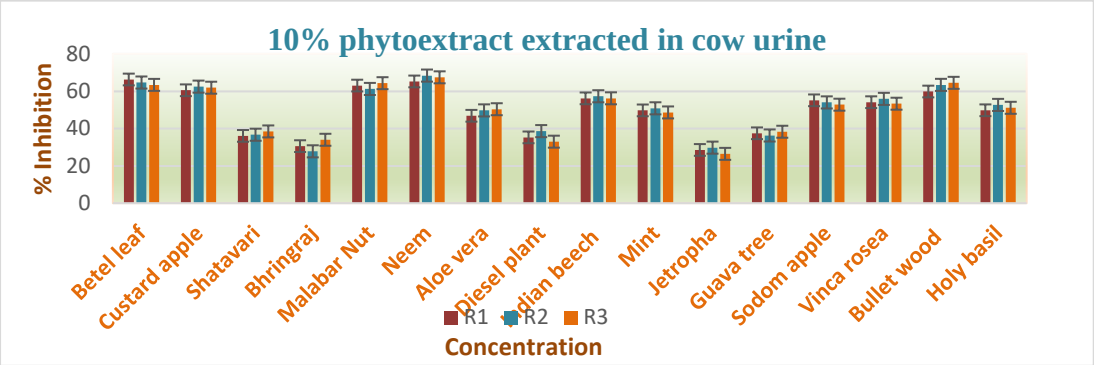


Figure 6.11: Antifungal activity assay of 10% phytoextracts in cow urine against *A. burnsii*

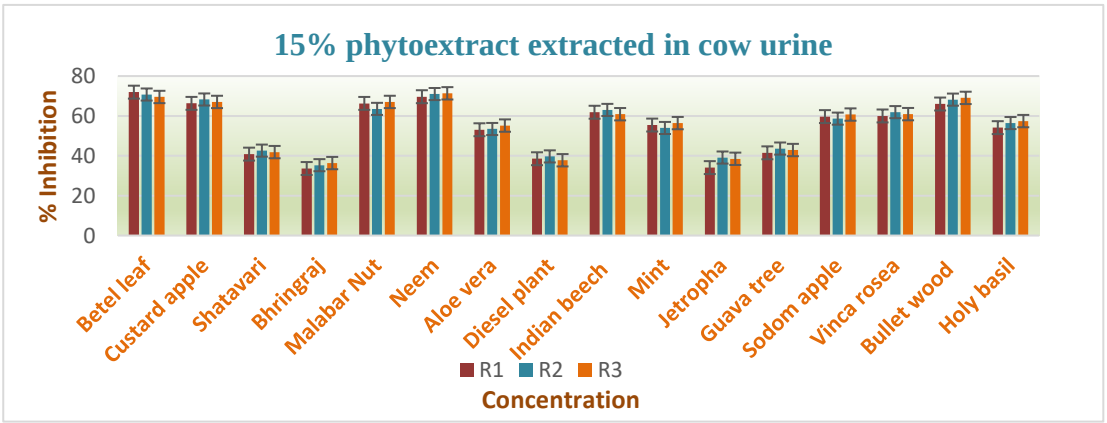


Figure: 6.12 Antifungal activity assay of 15% phytoextracts in water against *A. burnsii*

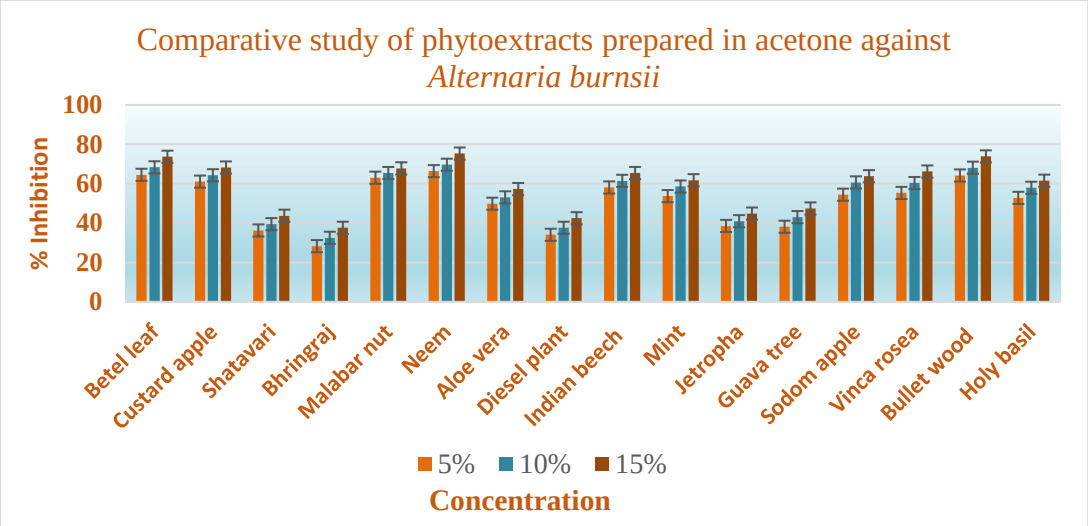


Figure 6.13: Efficacy of phytoextract extracted in cow urine at different concentrations against *Alternaria burnsii*

The data Table (Table:6.10 to Table: 6.13) revealed the in vitro evaluation of 5%, 10% and 15% phytoextract extracted in acetone against *Alternaria burnsii*

At a concentration of 5% (Figure 6.10), the highest inhibition was seen with the Neem (63.72%) and Adulsa (60.44%) phytoextracts prepared with cow urine. The efficacy of other phytoextracts tested from betel leaf, custard apple, akdo, Indian beech, Vinca Rosea, and Bullet wood ranged from 49.0% to 59.55%. The least inhibition was seen with Jetropha (24.16%) and Bhringraj (26.76%).

67.05%, the highest inhibition was recorded by Neem, followed by Betel leaf (64.81%) at 10% concentration.62.6% inhibition was recorded by bullet wood (Figure 6.11). 51.2 % to 62.87% efficacy was recorded by the extract of Custard apple, Adulsa, Indian beech, Akdo, Vinca rosea, and Holy basil. The least efficacy was recorded by Jetropha (28.24%) and Bhringraj (30.78%).

The highest inhibition was recorded by Betel leaf (70.74%) and Neem (70.66%) at 15% concentration (Figure 6.12), followed by Bullet wood (67.74%) and Custard apple (67.2%). The efficacy of other tested plants was in the range of 55.99 % to 65.62% recorded by Adulsa, Indian beech, Akdo, Holy Basil, and Vinca rosea. The least efficacy was recorded by Bhringraj (35.09%), Jatropha (37.24%), and the Diseal plant (38.67%).

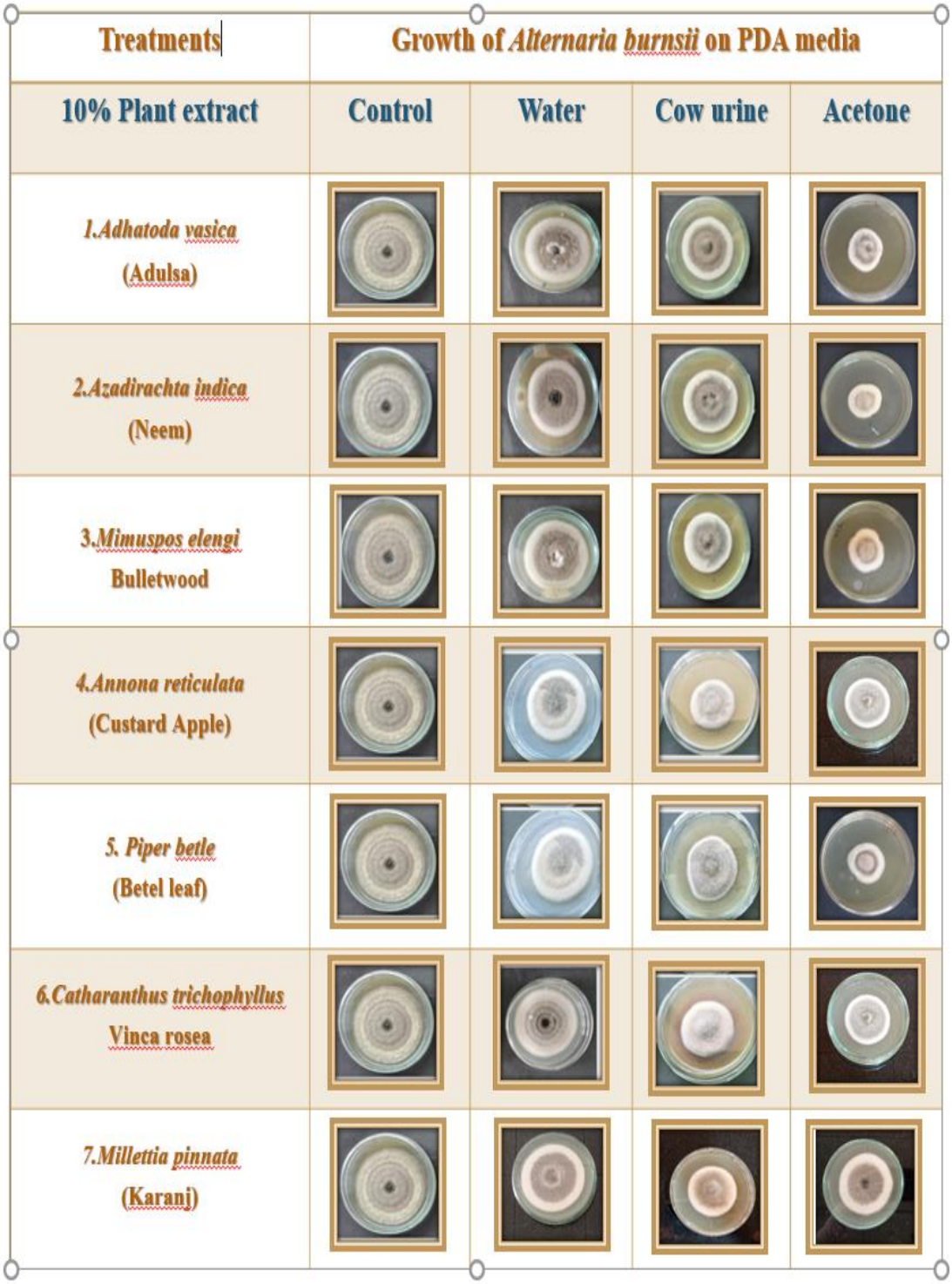


Figure 6.14: Invitro evaluation of 10% phytoextracts in different solvents against *Alternaria burnsii* on PDA media

6.3.2 After seven days of incubation at 28°C, growth of *F. oxysporum* was inhibited through different phytoextract amounts obtained with different solvents in order.

6.3.2.1 In vitro efficacy of phytoextract extracted in water at different concentrations

Treatments	PGI at 5% concentration/Replication			Mean % PGI
	R1	R2	R3	
Betel leaf	48.19 (55.55)	45.65 (51.13)	46.84 (53.21)	46.89 (53.30)
Custard apple	46.27 (52.22)	45.69 (51.21)	47.91 (55.07)	46.62 (52.83)
Shatavari	32.83 (29.40)	31.61 (27.46)	28.13 (22.22)	30.86 (26.31)
Bhringraj	26.37 (19.73)	30.34 (25.52)	31.81 (27.77)	29.51 (24.26)
Malabar Nut	50.12 (58.88)	50.92 (60.25)	50.71 (59.90)	50.58 (59.68)
Neem	51.66 (61.51)	52.55 (63.02)	51.23 (60.78)	51.81 (61.78)
Aloe vera	40.83 (42.75)	41.35 (43.64)	41.85 (44.51)	41.34 (43.64)
Diesel plant	36.45 (35.30)	35.75 (34.13)	34.91 (32.75)	35.70 (34.06)
Indian beech	43.78 (47.86)	41.55 (44.00)	42.45 (45.55)	42.59 (45.80)
Mint	39.27 (40.06)	41.52 (43.93)	40.34 (41.90)	40.38 (41.97)
Jetropha	29.30 (23.96)	30.01 (25.07)	31.64 (27.55)	30.34 (25.52)
Guava tree	32.54 (28.94)	33.58 (30.58)	35.08 (32.94)	33.72 (30.81)
Sodom apple	42.43 (45.52)	44.13 (48.52)	43.53 (47.51)	43.39 (47.18)
Vinca rosea	44.17 (48.56)	43.40 (47.24)	45.59 (51.01)	44.39 (48.94)
Bullet wood	51.28 (60.87)	51.57 (61.34)	50.54 (59.63)	51.13 (60.62)
Holy basil	42.45 (45.55)	44.53 (49.28)	43.77 (47.74)	43.58 (47.53)
S.Em				0.75
C.D.at 5%				2.17
C.V.				3.15

Table 6.14: In vitro efficacy of 5% phytoextract extracted in water against *Fusarium oxysporum* on PDA media

Note: The data are retransformed inside the brackets, whereas the data outside the brackets are arcsine transformed.

Treatments (water)	PGI at 10 % concentration/Replication			Mean % PGI
	R1	R2	R3	
Betel leaf	49.50 (57.83)	51.92 (61.96)	49.90 (58.51)	50.44 (59.44)
Custard apple	47.40 (54.18)	45.07 (50.12)	45.84 (51.47)	46.11 (51.93)
Shatavari	33.21 (30)	32.11 (28.26)	31.21 (26.85)	32.18 (28.37)
Bhringraj	27.8 (21.8)	28.99 (23.5)	27.08 (20.73)	27.97 (22.00)
Malabar Nut	50.99 (60.38)	52.35 (62.68)	53.48 (64.58)	52.28 (62.56)
Neem	54.44 (66.18)	53.39 (64.44)	54.52 (66.32)	54.12 (65.65)
Aloe vera	37.11 (36.41)	37.73 (37.45)	38.44 (38.65)	37.76 (37.51)
Diesel plant	37.07 (36.34)	35.04 (32.97)	35.72 (34.08)	35.95 (34.46)
Indian beech	40.88 (42.83)	42.03 (44.83)	44.37 (48.91)	42.43 (45.52)
Mint	42.24 (45.2)	43.48 (47.35)	42.49 (45.63)	42.74 (46.06)
Jetropha	29.22 (23.84)	30.11 (25.17)	29.29 (23.94)	29.55 (24.32)
Guava tree	33.60 (30.63)	36.26 (34.98)	35.10 (33.07)	34.99 (32.89)
Sodom apple	42.74 (46.06)	43.58 (47.52)	44.08 (48.41)	43.47 (47.33)
Vinca rosea	42.95 (46.43)	42.15 (45.05)	41.60 (44.08)	42.24 (45.19)
Bullet wood	53.46 (64.55)	55.04 (67.17)	54.37 (66.06)	54.29 (65.94)
Holy basil	41.39 (43.72)	42.46 (45.57)	41.95 (44.68)	41.94 (44.66)
S.Em				0.58
C.D.at 5%				1.66
C.V.				2.39

Table 6.15: In vitro efficacy of 10% phytoextract extracted in water against *Fusarium oxysporum* on PDA media

Note: The data are retransformed inside the brackets, whereas the data outside the brackets are arcsine transformed.

Treatments	PGI at 15% concentration/Replication			Mean % PGI
	R1	R2	R3	
Betel leaf	52.64 (63.2)	54.54 (66.35)	53.31 (64.31)	53.51 (64.63)
Custard apple	49.11 (57.15)	47.76 (54.81)	48.54 (56.16)	48.47 (56.05)
Shatavari	34.58 (3.22)	35.26 (33.33)	33.05 (29.74)	34.30 (31.76)
Bhringraj	30.46 (25.7)	32.28 (28.53)	32.74 (29.25)	31.83 (27.82)
Malabar Nut	54.28 (65.92)	55.44 (67.82)	56.64 (69.76)	55.46 (67.85)
Neem	57.17 (70.61)	55.80 (68.41)	56.97 (70.3)	56.65 (69.78)
Aloe vera	40.32 (41.87)	40.52 (42.22)	40.91 (42.88)	40.59 (42.33)
Diesel plant	38.66 (39.03)	38.33 (38.47)	37.70 (37.4)	38.24 (38.30)
Indian beech	47.92 (55.1)	47.28 (53.97)	46.36 (52.37)	47.19 (53.82)
Mint	44.43 (49.01)	45.39 (50.68)	45.64 (51.13)	45.16 (50.28)
Jetropha	31.65 (27.54)	31.86 (27.86)	32.66 (29.13)	32.06 (28.18)
Guava tree	35.37 (33.52)	39.53 (40.51)	38.15 (38.16)	37.69 (37.38)
Sodom apple	44.44 (49.03)	45.71 (51.25)	44.77 (49.61)	44.98 (49.97)
Vinca rosea	45.28 (50.48)	44.81 (49.67)	44.42 (48.98)	44.84 (49.72)
Bullet wood	55.72 (68.28)	56.83 (70.06)	57.65 (71.37)	56.74 (69.92)
Holy basil	43.38 (47.17)	43.87 (48.04)	44.58 (49.27)	43.95 (48.17)
S.Em				0.54
C.D.at 5%				1.56
C.V.				2.11

Table 6.16: In vitro efficacy of 15% phytoextract extracted in water against *Fusarium oxysporum* on PDA media

Note: The data are retransformed inside the brackets, whereas the data outside the brackets are arcsine transformed.

Treatments	Concentration (%)/ percent inhibition*			Mean % PGI
	5%	10%	15%	
Betel leaf	48.19 (55.55)	50.44 (59.43)	53.50 (64.62)	50.71 (59.90)
Custard apple	42.95 (46.42)	46.10 (51.92)	48.47 (56.04)	45.84 (51.47)
Shatavari	29.84 (24.76)	32.18 (28.37)	34.30 (31.76)	32.11 (28.26)
Bhringraj	24.49 (17.19)	27.98 (22.01)	31.83 (27.82)	28.11 (22.19)
Malabar Nut	49.98 (58.66)	52.27 (62.55)	55.45 (67.83)	52.57 (63.03)
Neem	51.81 (61.77)	54.12 (65.65)	56.64 (69.77)	54.19 (65.77)
Aloe vera	34.52 (32.12)	37.76 (37.50)	40.58 (42.32)	37.63 (37.27)
Diesel plant	33.99 (31.26)	35.95 (34.47)	38.23 (38.30)	36.06 (34.65)
Indian beech	39.48 (40.42)	42.43 (45.52)	47.19 (53.81)	43.03 (46.57)
Mint	40.09 (41.47)	42.74 (46.06)	45.15 (50.27)	42.66 (45.93)
Jetropha	26.02 (19.25)	29.55 (24.32)	32.06 (28.18)	29.21 (23.82)
Guava tree	32.74 (29.25)	35.00 (32.9)	37.70 (37.4)	35.15 (33.14)
Sodom apple	41.52 (43.94)	43.47 (47.33)	44.98 (49.96)	43.33 (47.08)
Vinca rosea	40.22 (41.70)	42.23 (45.18)	44.83 (49.71)	42.43 (45.33)
Bullet wood	52.34 (62.67)	54.29 (65.93)	56.73 (69.91)	54.46 (66.20)
Holy basil	39.66 (40.74)	41.93 (44.66)	43.94 (48.16)	41.85 (44.51)
S.Em				1.5
C.D.at 5%				4.4
C.V.				6.24

Table 6.17: In vitro efficacy of phytoextract extracted water at different concentrations against *Fusarium oxysporum* on PDA media

Note: The data are retransformed inside the brackets, whereas the data outside the brackets are arcsine transformed.

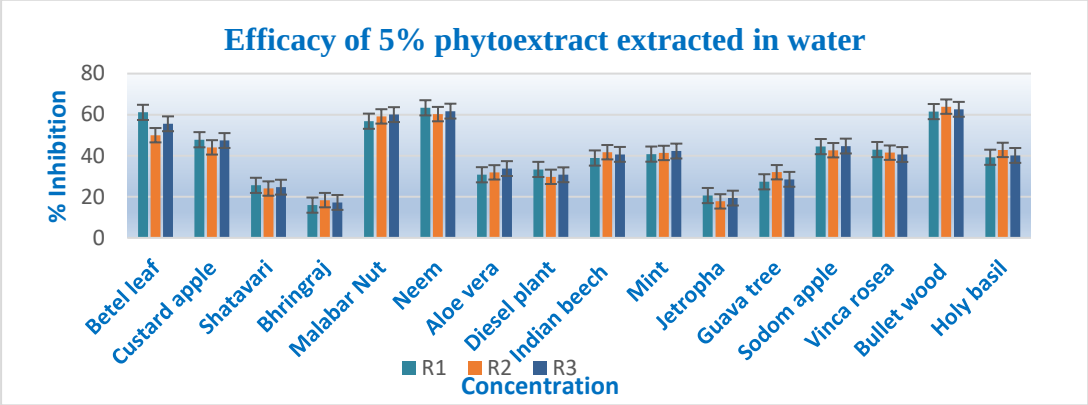


Figure 6.15: Efficacy of 5%phytoextract in water against *Fusarium oxysporum*

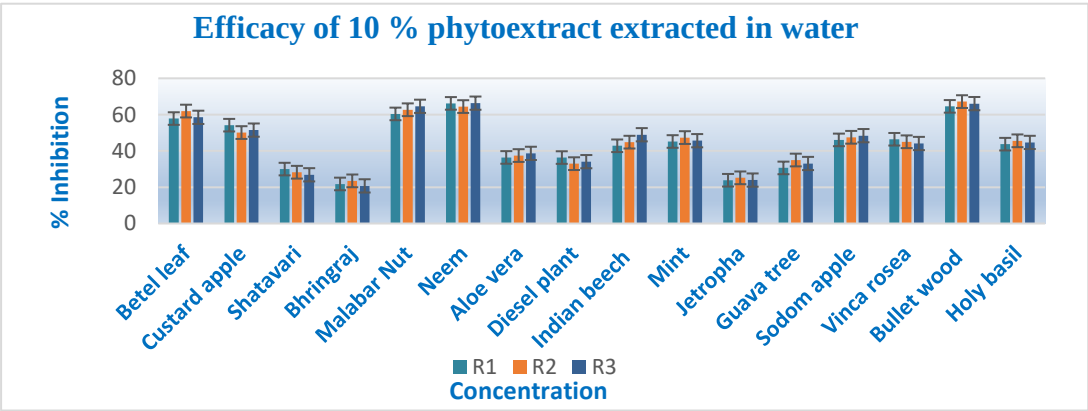


Figure 6.16: Efficacy of 10% phytoextract in water against *Fusarium oxysporum*

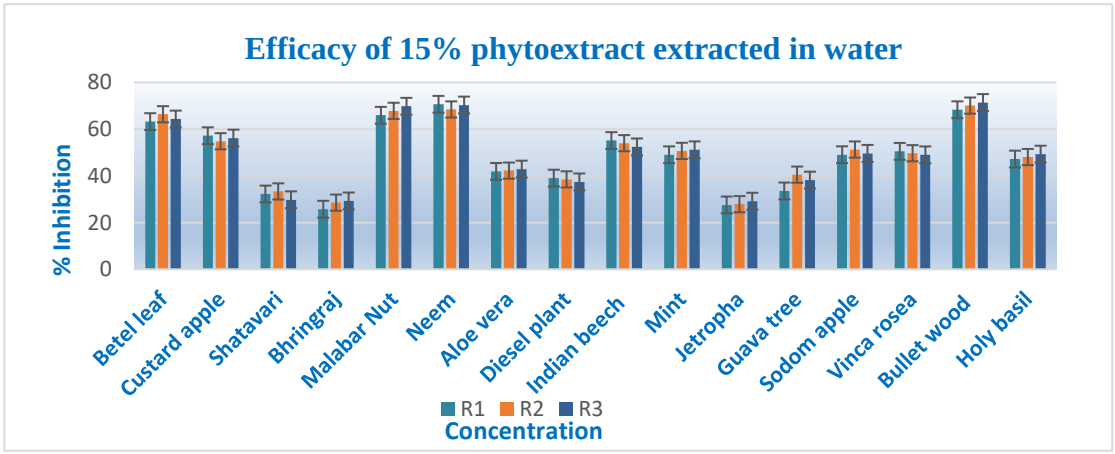


Figure 6.17: Efficacy of 15% phytoextract in water against *Fusarium oxysporum*

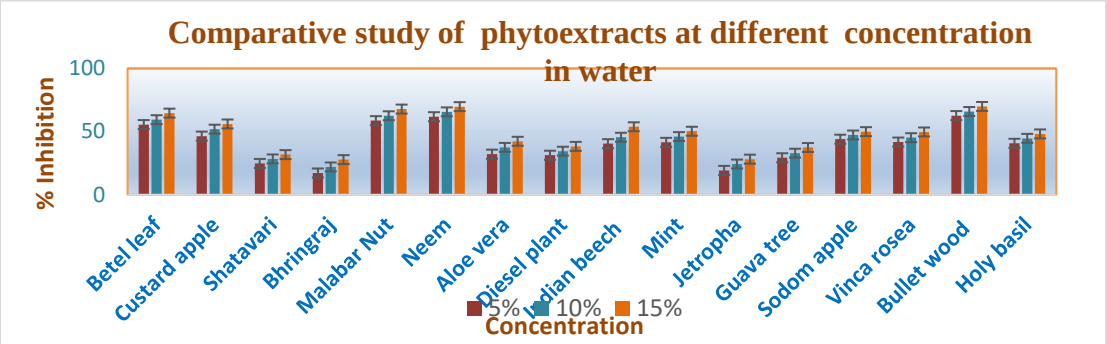


Figure 6.18: Efficacy of phytoextracts extracted in water at different concentrations against *Fusarium oxysporum.*

The data Table (Table:6.14 to Table: 6.17) revealed the in vitro evaluation of 5%, 10%, and 15% phytoextract extracted in water against *Fusarium oxysporum.*

(Figure 6.15) Bullet wood reported the strongest inhibition at 5% concentration (62.67%), followed by neem (61.77%). Adulsa (58.66%) was the third-place competitor. The betel leaf, custard apple, Indian beech, Mint, Holy basil, and Vinca rosea showed inhibition ranging from 40.42 to 55.55%. Aloe vera, Guava trees, Shatavari, and Diesel plants all had the lowest effectiveness ratings.

Bellet wood and neem had the highest levels of inhibition (Figure 6.16) at 10% concentration (65.93% and 65.65%, respectively). Adulsa recorded a 62.55% inhibition. Other studied plants, including betel leaf, custard apple, Indian beech, mint, Sodom apple, Vinca rosea, and holy basil, revealed inhibition ranging from 45.18% to 59.43%. In the range of 22.01% -37.50%, Shatavari, Bhringraj, Aloe vera, Diesel plant, Jetroph, and Guava tree exhibited the least amount of inhibition.

At 15% concentration (Figure 6.17), Bullet wood and Neem both revealed inhibition at 69.91% and 69.77% respectively. Adulsas and betel leaves both revealed 67.83% and 64.82% inhibition, respectively. Other plants, like Custard apple, Aloe vera, Indian beech, Mint, Sodom apple, Vinca rosea, and holy basil, exhibited an inhibitory range of 42.32%–56.04%. Bhrinraj, Shatavari, Diesel Plant, Jatropha, and Guava Tree had the lowest effectiveness, ranging between 27.82% and 38.30%.

6.3.2.2 In vitro efficacy of phytoextract extracted in acetone at different concentrations on PDA media

Treatments	PGI at 5% concentration/Replication			Mean % PGI
	R1	R2	R3	
Betel leaf	53.69 (64.8)	53.09 (63.94)	54.52 (66.32)	53.74 (65.03)
Custard apple	50.48 (59.4)	49.05 (57.05)	49.77 (58.28)	49.75 (58.25)
Shatavari	34.49 (31.96)	32.52 (28.91)	31.54 (27.36)	32.83 (29.40)
Bhringraj	27.75 (21.74)	29.22 (23.84)	28.56 (22.85)	28.53 (22.81)
Malabar Nut	52.37 (62.73)	53.03 (63.84)	53.40 (64.46)	52.94 (63.68)
Neem	56.89 (70.14)	55.72 (68.28)	53.40 (64.46)	55.34 (67.66)
Aloe vera	41.84 (44.58)	41.61 (44.1)	43.31 (47.05)	42.27 (45.25)
Diesel plant	37.72 (37.4)	36.31 (35.07)	36.98 (36.18)	37.00 (36.22)
Indian beech	44.65 (49.4)	44.03 (48.31)	45.06 (50.11)	44.58 (49.27)
Mint	43.45 (47.3)	44.01 (28.91)	42.74 (46.06)	43.41 (47.22)
Jetropha	32.23 (28.45)	32.52 (36.28)	33.34 (30.21)	32.70 (29.19)
Guava tree	34.97 (32.85)	37.04 (49.76)	34.44 (31.98)	35.49 (33.70)
Sodom apple	44.08 (48.41)	44.86 (49.64)	45.00 (50.01)	44.65 (49.40)
Vinca rosea	45.43 (50.75)	44.79 (68.65)	46.20 (52.01)	45.48 (50.83)
Bullet wood	54.52 (66.31)	55.95 (50.75)	56.56 (69.64)	55.68 (68.21)
Holy basil	44.23 (48.65)	45.43 (68.65)	47.36 (54.12)	45.68 (51.18)
S.Em				0.57
C.D.at 5%				1.64
C.V.				2.23

Table 6.18: In vitro efficacy of 5% phytoextract extracted in acetone against *Fusarium oxysporum* on PDA media

Note: The data are retransformed inside the brackets, whereas the data outside the brackets are arcsine transformed.

Treatments	PGI at 10 % concentration/Replication			Mean % PGI
	R1	R2	R3	
Betel leaf	57.18 (70.63)	55.72 (68.28)	58.52 (72.72)	57.15 (70.57)
Custard apple	53.03 (63.84)	51.99 (62.08)	52.44 (62.85)	52.49 (62.93)
Shatavari	35.98 (34.52)	35.04 (32.97)	32.28 (28.53)	34.44 (31.98)
Bhringraj	30.70 (26.06)	32.23 (28.45)	31.46 (27.24)	31.47 (27.25)
Malabar Nut	55.12 (67.3)	55.72 (68.28)	56.41 (69.4)	55.75 (68.33)
Neem	58.92 (73.35)	57.50 (71.13)	56.88 (70.15)	57.77 (71.56)
Aloe vera	44.16 (48.53)	42.80 (46.16)	44.60 (49.31)	43.86 (48.00)
Diesel plant	40.28 (41.8)	39.58 (40.61)	38.97 (39.56)	39.62 (40.66)
Indian beech	46.98 (53.54)	47.91 (55.07)	46.53 (52.67)	47.14 (53.74)
Mint	45.30 (50.53)	47.26 (53.94)	45.70 (51.22)	46.09 (51.90)
Jetropha	35.12 (33.1)	35.72 (34.08)	36.40 (35.22)	35.75 (34.13)
Guava tree	37.77 (37.52)	38.97 (39.56)	38.50 (38.76)	38.42 (38.62)
Sodom apple	46.67 (52.92)	47.36 (54.12)	47.41 (54.21)	47.15 (53.75)
Vinca rosea	48.05 (55.32)	47.42 (54.22)	48.82 (56.65)	48.10 (55.40)
Bullet wood	57.26 (70.75)	58.75 (73.1)	59.03 (73.52)	58.35 (72.47)
Holy basil	47.05 (53.57)	48.05 (55.32)	48.63 (56.32)	47.91 (55.08)
S.Em				0.53
C.D.at 5%				1.54
C.V.				1.98

Table 6.19: In vitro efficacy of 10% phytoextract extracted in acetone against *Fusarium oxysporum* on PDA media

Note: The data are retransformed inside the brackets, whereas the data outside the brackets are arcsine transformed.

Treatments	PGI at 15 % concentration/Replication			Mean % PGI
	R1	R2	R3	
Betel leaf	60.73 (76.18)	58.92 (73.35)	59.72 (74.58)	59.82 (74.72)
Custard apple	54.92 (67.05)	54.44 (66.17)	55.27 (67.54)	54.90 (66.93)
Shatavari	39.00 (39.62)	39.01 (39.62)	35.04 (32.97)	37.69 (37.38)
Bhringraj	33.57 (30.55)	33.94 (31.17)	34.89 (32.73)	34.13 (31.49)
Malabar Nut	57.56 (71.26)	58.90 (73.33)	59.24 (73.84)	58.58 (72.82)
Neem	61.73 (77.64)	60.54 (75.82)	59.89 (74.83)	60.74 (76.11)
Aloe vera	46.64 (52.95)	45.22 (50.38)	47.24 (53.91)	46.39 (52.42)
Diesel plant	42.74 (46.06)	43.45 (47.3)	41.53 (43.96)	42.58 (45.78)
Indian beech	49.70 (58.16)	49.12 (57.17)	48.34 (55.82)	49.06 (57.06)
Mint	47.21 (53.85)	49.25 (57.4)	48.50 (56.1)	48.32 (55.79)
Jetropha	36.93 (36.12)	37.71 (37.42)	38.32 (38.45)	37.66 (37.33)
Guava tree	41.02 (43.2)	41.67 (44.21)	41.81 (44.44)	41.53 (43.95)
Sodom apple	49.17 (57.17)	49.98 (58.65)	49.26 (57.41)	49.46 (57.75)
Vinca rosea	50.83 (60.11)	50.73 (59.93)	51.90 (61.73)	51.16 (60.66)
Bullet wood	60.28 (75.34)	60.80 (76.2)	61.71 (77.54)	60.91 (76.37)
Holy basil	49.28 (57.42)	49.85 (58.43)	50.63 (59.77)	49.92 (58.55)
S.Em				0.54
C.D.at 5%				1.55
C.V.				1.88

Table 6.20: In vitro efficacy of 15% phytoextract extracted in acetone against *Fusarium oxysporum* on PDA media

Note: The data are retransformed inside the brackets, whereas the data outside the brackets are arcsine transformed.

Treatments	Concentration (%)/ percent inhibition*			Mean % PGI
	5%	10%	15%	
Betel leaf	53.74 (65.02)	57.13 (70.55)	59.80 (74.71)	56.90 (70.17)
Custard apple	49.74 (58.24)	52.49 (62.92)	54.89 (66.92)	52.38 (62.72)
Shatavari	32.84 (29.41)	34.45 (32.01)	37.70 (37.40)	35.00 (32.90)
Bhringraj	28.53 (22.81)	31.47 (27.25)	34.13 (31.48)	31.38 (27.11)
Malabar Nut	52.94 (63.68)	55.75 (68.32)	58.57 (72.81)	55.76 (68.33)
Neem	55.32 (67.63)	57.76 (71.54)	60.73 (76.1)	57.94 (71.83)
Aloe vera	42.27 (45.24)	43.85 (48.03)	46.38 (52.41)	44.17 (48.55)
Diesel plant	37.00 (36.22)	39.61 (40.65)	42.57 (45.77)	39.73 (40.86)
Indian beech	44.58 (49.27)	47.14 (53.73)	49.05 (57.05)	46.93 (53.36)
Mint	43.40 (47.21)	46.08 (51.09)	48.32 (55.78)	45.94 (51.64)
Jetropha	32.70 (29.19)	35.75 (34.13)	37.66 (37.33)	35.37 (33.51)
Guava tree	35.49 (33.71)	38.42 (38.61)	41.52 (43.95)	38.48 (38.72)
Sodom apple	44.65 (49.39)	47.15 (53.75)	49.45 (57.74)	47.09 (53.64)
Vinca rosea	45.47 (50.83)	48.10 (55.4)	51.15 (60.65)	48.24 (55.65)
Bullet wood	55.67 (68.20)	58.34 (72.45)	60.91 (76.36)	58.31 (72.40)
Holy basil	45.67 (51.17)	47.91 (55.07)	49.92 (58.54)	47.84 (54.94)
S.Em				1.50
C.D.at 5%				4.33
C.V.				5.55

Table 6.21: In vitro efficacy of phytoextract extracted acetone at different concentrations against *Fusarium oxysporum* on PDA media

Note: The data are retransformed inside the brackets, whereas the data outside the brackets are arcsine transformed.

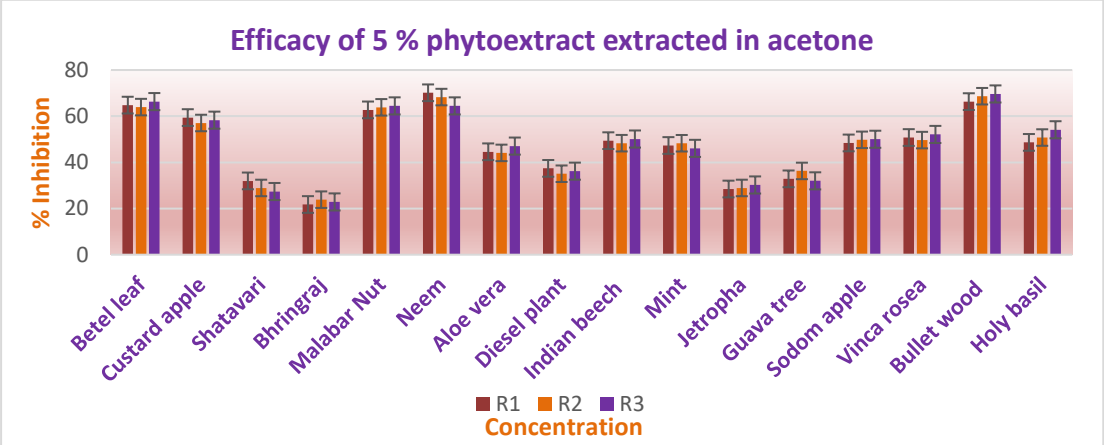


Figure 6.19: Antifungal activity of 5% phytoextracts in acetone against *F. oxysporum*

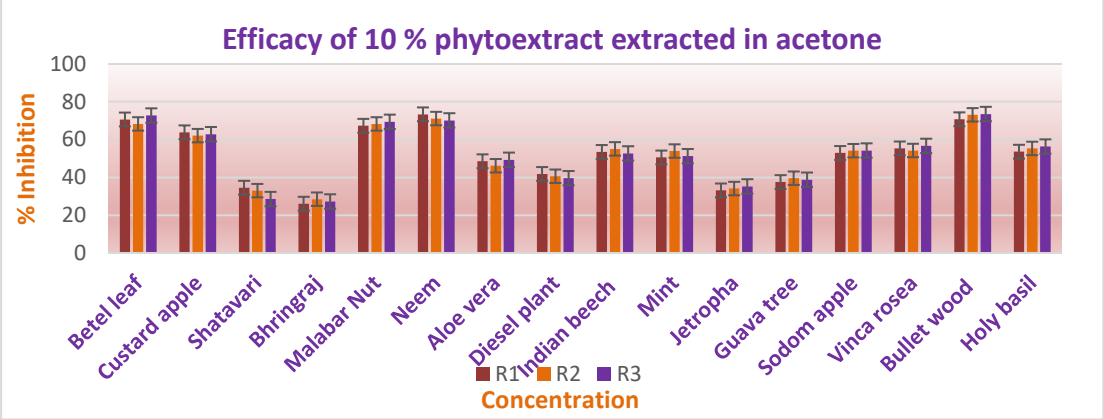


Figure 6.20: Antifungal activity of 10 % phytoextracts in acetone against *F. oxysporum*

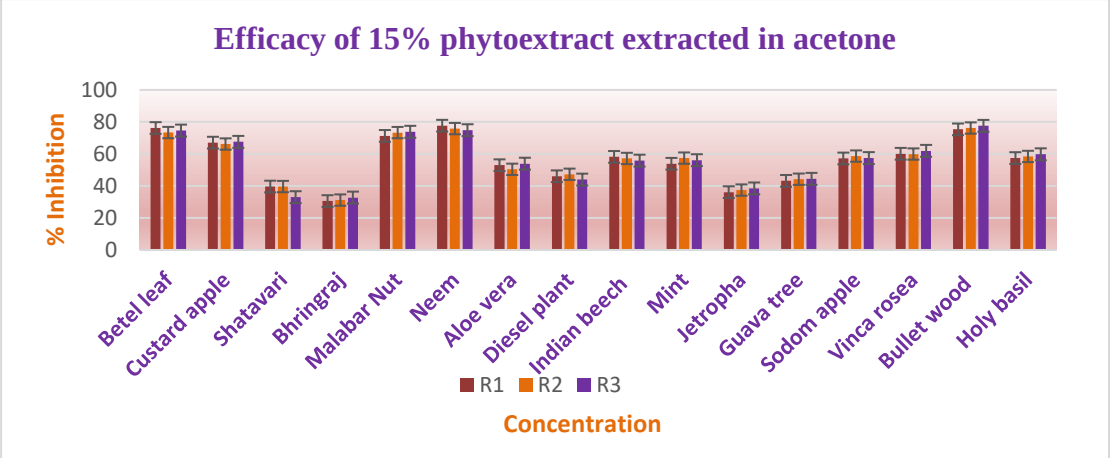


Figure 6.21: Antifungal activity of 15 % phytoextracts in acetone against *F. oxysporum*

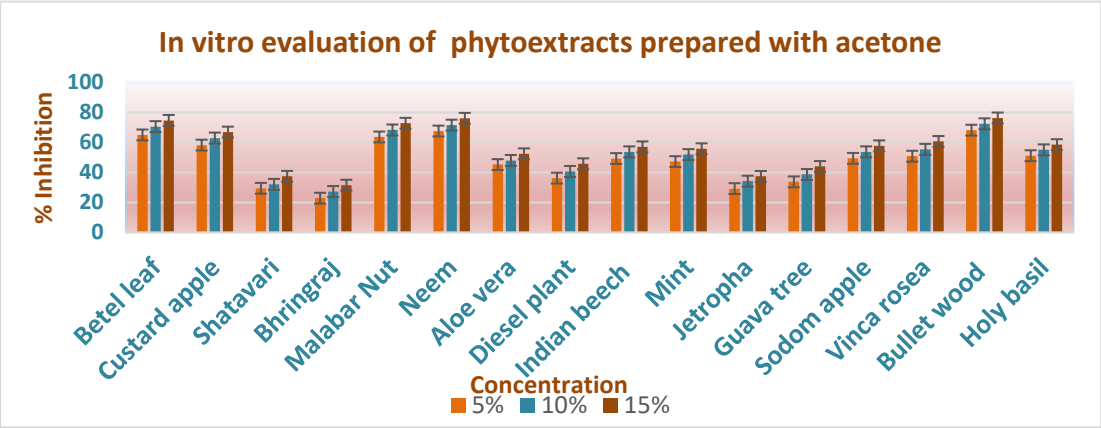


Figure 6.22: Efficacy of various phytoextracts with acetone at different concentrations against *Fusarium oxysporum*

The data Table (Table:6.18 to Table: 6.21) revealed the in vitro evaluation of 5%, 10%, and 15% phytoextract extracted in water against *Fusarium oxysporum*

The maximum inhibition was observed for Bullet wood (68.20%) and Neem (67.63%) at 5% concentration with acetone (Figure 6.19). Adulsa and betel leaf, however, exhibited inhibition of 65.02% and 63.68%, respectively. Custard apple, Aloe vera, Indian beech, Mint, Sodom apple, Vinca rosea, and Holy Basil all revealed inhibition ranging from 45.24% to 58.24%. Shatavari, Bhringraj, Diesel plant, Guava tree, and Jatropha showed the least effectiveness rates, ranging from 22.81 to 36.22%.

The maximum inhibition was observed at 10% concentrations (Figure 6.20) of Bullet wood and neem (72.45% and 71.54%) respectively. Betel leaf, which was in the third position, reported an inhibition of 70.55%. Other examined plants were Custard apple, Adulsa, Aloe vera, Diesel plant, Indian beech, Mint, Sodom apple, Vinca rosea, and Holy basil, which exhibited rates between 40.65% and 68.32%. Shatavari, Bhringraj, Jetropha, and Guava trees exhibited the lowest effectiveness in the range of 27.25% - 38.61%.

At a 15% concentration (Figure 6.21), Bullet Wood (76.36%) and Neem (76.1%) exhibited the highest percentages of inhibition. Betel leaf had the third-highest effectiveness (74.71%). Adulsa demonstrated a 72.81% inhibition. The effectiveness of the other plant under examination was found to be between 43.95% and 66.92%. Shatavari, Bhringraj, and Jetropha showed the least amount of inhibition, between 31.48% and 37.40%.

6.3.2.3 In vitro efficacy of phytoextract extracted in cow urine at different concentrations

Treatments	PGI at 5% concentration/Replication			Mean % PGI
	R1	R2	R3	
Betel leaf	52.58 (63.07)	51.23 (60.78)	53.17 (64.06)	52.33 (62.65)
Custard apple	48.54 (56.17)	47.36 (54.12)	47.99 (55.21)	47.97 (55.17)
Shatavari	32.93 (29.56)	31.64 (27.52)	28.72 (23.1)	31.10 (26.68)
Bhringraj	25.59 (18.65)	27.96 (21.98)	23.89 (16.41)	25.82 (18.97)
Malabar Nut	50.55 (59.63)	51.34 (60.98)	52.07 (62.22)	51.33 (60.95)
Neem	55.18 (67.14)	53.92 (65.32)	52.79 (63.44)	53.97 (65.40)
Aloe vera	39.24 (40.02)	38.43 (38.63)	37.77 (37.52)	38.48 (38.72)
Diesel plant	35.72 (34.08)	34.36 (31.85)	33.81 (30.97)	34.63 (32.30)
Indian beech	42.88 (46.31)	41.81 (44.44)	42.25 (45.21)	42.32 (45.32)
Mint	41.60 (44.08)	42.44 (45.54)	41.02 (43.08)	41.69 (44.24)
Jetropha	29.30 (23.95)	29.63 (24.44)	29.87 (24.81)	29.60 (24.40)
Guava tree	33.06 (29.76)	34.97 (32.85)	32.35 (28.64)	33.47 (30.41)
Sodom apple	41.86 (44.53)	41.66 (44.18)	44.16 (48.53)	42.56 (45.75)
Vinca rosea	43.15 (46.77)	41.60 (44.08)	43.29 (47.03)	42.69 (45.97)
Bullet wood	51.50 (61.25)	53.46 (64.56)	53.02 (63.82)	52.67 (63.22)
Holy basil	42.24 (45.2)	43.14 (46.75)	44.41 (48.97)	43.27 (46.98)
S.Em				0.66
C.D.at 5%				1.91
C.V.				2.73

Table 6.22: In vitro efficacy of 5% phytoextract extracted in cow urine against *Fusarium oxysporum* on PDA media

Note: The data are retransformed inside the brackets, whereas the data outside the brackets are arcsine transformed.

Treatments	PGI at 10 % concentration/Replication			Mean % PGI
	R1	R2	R3	
Betel leaf	55.95 (68.65)	53.87 (65.24)	57.94 (71.83)	55.93 (68.61)
Custard apple	50.54 (59.62)	49.84 (58.41)	50.69 (59.87)	50.36 (59.30)
Shatavari	34.42 (31.96)	33.66 (30.73)	30.19 (25.3)	32.77 (29.29)
Bhringraj	28.72 (23.01)	30.93 (26.42)	28.30 (22.47)	29.32 (23.98)
Malabar Nut	52.66 (63.22)	53.76 (65.06)	54.72 (66.65)	53.72 (64.99)
Neem	57.34 (70.88)	56.78 (70)	55.04 (67.17)	56.39 (69.37)
Aloe vera	41.96 (44.71)	41.66 (44.18)	40.59 (42.33)	41.41 (43.74)
Diesel plant	38.45 (38.66)	37.12 (36.43)	36.24 (34.95)	37.27 (36.68)
Indian beech	44.54 (49.21)	44.16 (48.53)	45.57 (51.01)	44.76 (49.59)
Mint	43.15 (46.77)	45.43 (50.75)	44.16 (48.53)	44.25 (48.69)
Jetropha	32.28 (28.53)	32.58 (29)	31.57 (27.42)	32.15 (28.32)
Guava tree	35.11 (33.08)	37.33 (36.77)	33.99 (31.26)	35.48 (33.69)
Sodom apple	45.07 (50.12)	44.41 (48.97)	45.84 (51.46)	45.11 (50.19)
Vinca rosea	46.47 (52.57)	44.11 (48.45)	45.04 (50.07)	45.21 (50.37)
Bullet wood	54.58 (66.41)	56.71 (69.87)	57.09 (70.48)	56.13 (68.94)
Holy basil	43.98 (48.23)	46.53 (52.67)	47.49 (54.35)	46.01 (51.76)
S.Em				0.76
C.D.at 5%				2.19
C.V.				2.94

Table 6.23: In vitro efficacy of 10% phytoextract extracted in cow urine against *Fusarium oxysporum* on PDA media

Note: The data are retransformed inside the brackets, whereas the data outside the brackets are arcsine transformed.

Treatments	PGI at 15% concentration/Replication			Mean % PGI
	R1	R2	R3	
Betel leaf	58.26 (72.33)	57.41 (70.98)	58.91 (73.34)	58.20 (72.23)
Custard apple	53.92 (65.33)	52.74 (63.34)	54.58 (66.42)	53.75 (65.04)
Shatavari	37.77 (37.52)	35.93 (34.44)	33.26 (30.08)	35.66 (33.98)
Bhringraj	31.01 (26.54)	33.89 (31.1)	33.12 (29.86)	32.68 (29.15)
Malabar Nut	54.58 (66.41)	55.95 (68.65)	57.27 (70.77)	55.94 (68.63)
Neem	60.12 (75.18)	58.67 (72.96)	57.34 (70.88)	58.71 (73.03)
Aloe vera	46.69 (52.96)	44.78 (49.63)	43.66 (47.67)	45.05 (50.09)
Diesel plant	41.24 (43.45)	40.95 (42.96)	40.27 (41.78)	40.82 (42.74)
Indian beech	48.83 (56.66)	48.05 (55.32)	46.97 (53.44)	47.95 (55.15)
Mint	45.50 (50.87)	47.98 (55.2)	46.97 (53.44)	46.82 (53.18)
Jetropha	35.12 (33.1)	34.44 (31.98)	33.59 (30.16)	34.39 (31.90)
Guava tree	37.88 (37.71)	39.94 (41.22)	38.58 (38.9)	38.81 (39.27)
Sodom apple	47.69 (54.68)	46.97 (53.44)	48.40 (55.92)	47.69 (54.69)
Vinca rosea	48.37 (55.87)	47.36 (54.12)	47.98 (55.2)	47.91 (55.07)
Bullet wood	58.50 (72.71)	59.41 (74.11)	60.96 (76.44)	59.63 (74.44)
Holy basil	48.04 (55.3)	48.40 (55.92)	48.90 (56.8)	48.45 (56.01)
S.Em				0.67
C.D.at 5%				1.94
C.V.				2.45

Table 6.24: In vitro efficacy of 15% phytoextract extracted in cow urine against *Fusarium oxysporum* on PDA media

Note: The data are retransformed inside the brackets, whereas the data outside the brackets are arcsine transformed.

Treatments	Concentration (%)/ percent inhibition*			Mean % PGI
	5%	10%	15%	
Betel leaf	58.26 (72.33)	57.41 (70.98)	58.91 (73.34)	58.20 (72.23)
Custard apple	53.92 (65.33)	52.74 (63.34)	54.58 (66.42)	53.75 (65.04)
Shatavari	37.77 (37.52)	35.93 (34.44)	33.26 (30.08)	35.66 (33.98)
Bhringraj	31.01 (26.54)	33.89 (31.1)	33.12 (29.86)	32.68 (29.15)
Malabar Nut	54.58 (66.41)	55.95 (68.65)	57.27 (70.77)	55.94 (68.63)
Neem	60.12 (75.18)	58.67 (72.96)	57.34 (70.88)	58.71 (73.03)
Aloe vera	46.69 (52.95)	44.78 (49.63)	43.66 (47.67)	45.05 (50.09)
Diesel plant	41.24 (43.45)	40.95 (42.96)	40.27 (41.78)	40.82 (42.74)
Indian beech	48.83 (56.66)	48.05 (55.32)	46.97 (53.44)	47.95 (55.15)
Mint	45.50 (50.87)	47.98 (55.2)	46.97 (53.44)	46.82 (53.18)
Jetropha	35.12 (33.1)	34.44 (31.98)	33.59 (30.61)	34.39 (31.90)
Guava tree	37.88 (37.71)	39.94 (41.22)	38.58 (38.9)	38.81 (39.27)
Sodom apple	47.69 (54.68)	46.97 (53.44)	48.40 (55.92)	47.69 (54.69)
Vinca rosea	48.37 (55.87)	47.36 (54.12)	47.98 (55.2)	47.91 (55.07)
Bullet wood	58.50 (72.71)	59.41 (74.11)	60.96 (76.44)	59.63 (74.44)
Holy basil	48.04 (55.3)	48.40 (55.92)	48.90 (56.8)	48.45 (56.01)
S.Em				0.67
C.D.at 5%				1.94
C.V.				2.45

* Average of 3 replicates

Table 6.25: In vitro efficacy of phytoextract extracted cow urine at different concentration against *Fusarium oxysporum* on PDA media

Note The data are retransformed inside the brackets, whereas the data outside the brackets are arcsine transformed.

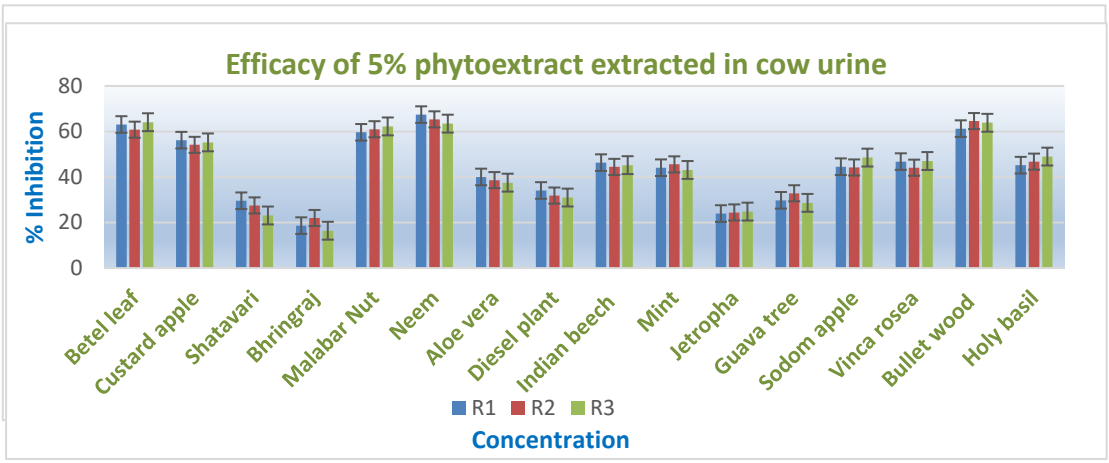


Figure 6.23: Antifungal activity of 5 % phytoextracts in cow urine against *F. oxysporum*

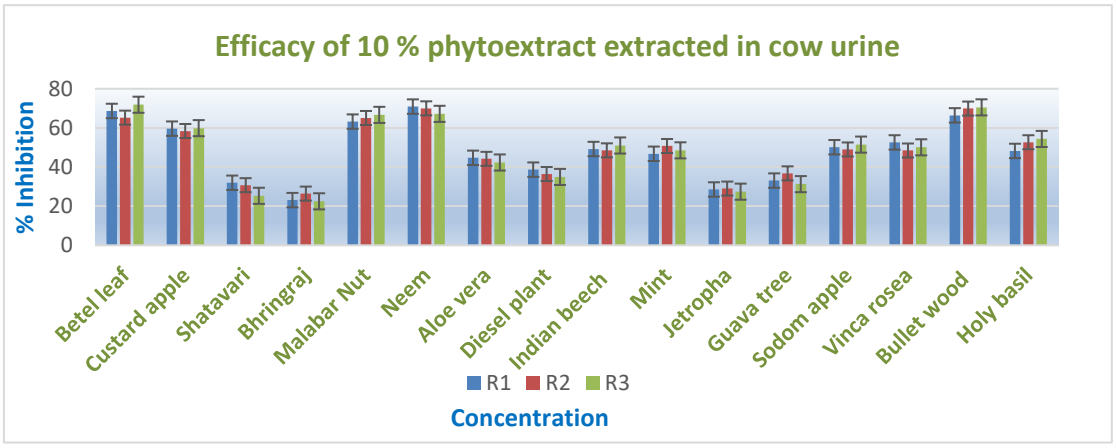


Figure 6.24: Antifungal activity of 10 % phytoextracts in cow urine against *F. oxysporum*

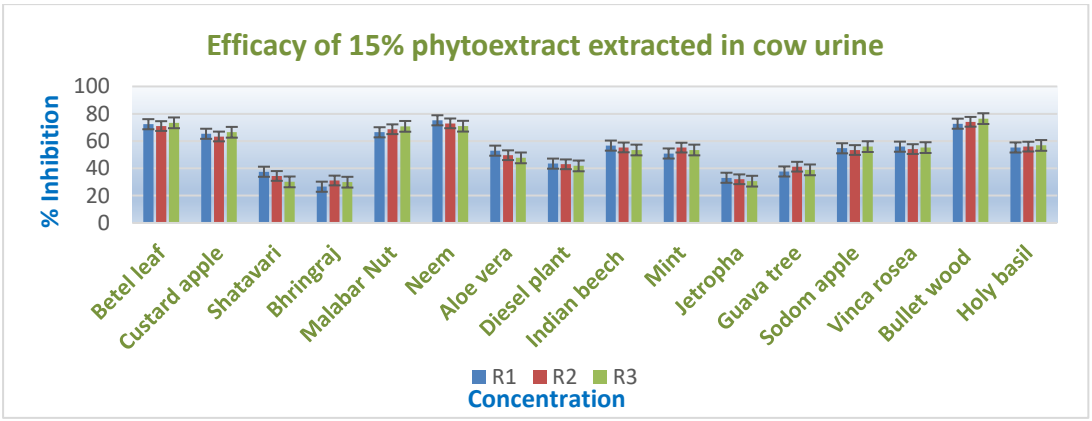


Figure 6.25: Antifungal activity of 15 % phytoextracts in cow urine against *F. oxysporum*

The data Table (Table:6.22 to Table: 6.25) revealed the in vitro evaluation of 5%, 10%, and 15% phytoextract extracted in cow urine against *Fusarium oxysporum.*
Neem (65.39%) and Bullet wood (63.21%) mixed with cow urine at a 5% concentration showed the highest levels of inhibition (Figure 6.22). Betel leaf measured a 62.64% inhibition. The other plants Custard apple, Indian beech, Mint, Sodom apple, Vinca rosea, and Holy basil showed effectiveness ranging from 45.96% to 60.94%. Shatavari, Bhringraj, Aloe vera, Diesel plant, Jatropha, and Guava tree had the lowest rates of effectiveness, ranging from 19.01% to 38.72%.

Neem, in a 10% concentration (Figure 6.23), exhibited the highest level of inhibition (69.35%), followed by Bullet wood (68.92%) and Betel leaf (68.75%). Adulsa demonstrated a 64.91% effectiveness. The inhibition was found to be between 49.58% and 59.30% in other examined plants such as Custard apple, Aloe vera, Indian beech, Mint, Sodom apple, Vinca rosea, and Holy basil. Shatavari, Bhringraj, Diesel plant, Jatropha, and Guava tree were found to be the least effective.

At 15% concentration (Figure 6.24), the highest inhibition was recorded by Bullet wood (74.42%), Neem (73.01%), Betel leaf (72.22 %) Adulsas (68.61%), and custard apples (65.03%) both provided good levels of initiation. Other studied plants, including Aloe vera, Diesel plant, Indian beech, Mint Sodom apple, Vinca rosea, and Holy basil, showed 42.73%–56.00% inhibition. Shatavari, Bhringraj, Jatropha, and Guava tree had the lowest effectiveness, which ranged from 29.17% to 39.27%.

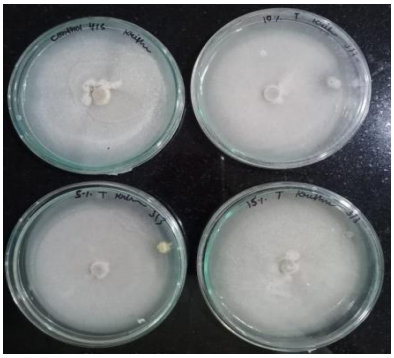
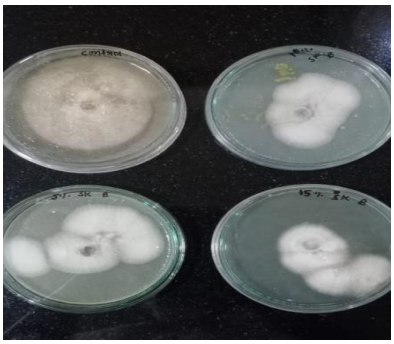
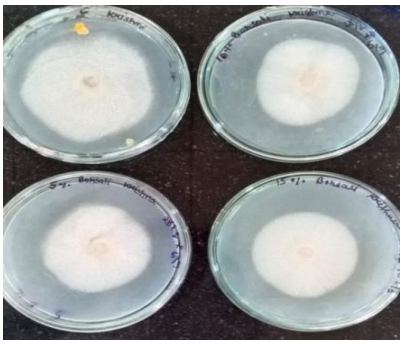
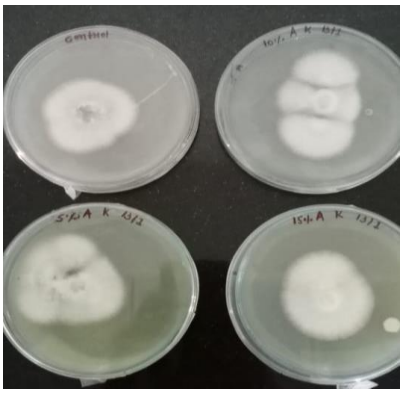
	
Control plates	**custard apple with cow urine**
	
Neem with acetone	**Adulsa with cow urine**
	
Betel leaf with cow urine	**Bullet wood with acetone**

Figure 6.26: Efficacy of 10% different phytoextract against *F. oxysporum* on PDA media