Plant Archives Vol. 20, Special Issue (AIAAS-2020), 2020 pp. 484-488 *ISSN 0972- 5210*

COMPARATIVE EVALUATION OF *CHENOPODIUM ALBUM* WEED ON ANTIOXIDANT AND ANTIFUNGAL ACTIVITY AGAINST FUNGAL PHYTOPATHOGENS

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Abstract

The various name weeds belongs to the family *Chenopodiaceae,* have so many beneficial values. It is a very fast growing and annually weeds. Respond against many microbes but most effective against fungal phytopathogens. Not only a single part, whole part (Seeds, Stem, Leaves & Root also). The phytochemical analysis showed the weed contains carbohydrates proteins, amino acids, terpenoids, alkaloids, saponins, tannins, flavonoids, steroids, fixed oils and pharmacological investigations revealed that *Chenopodium album* possessed antioxidant, reproductive, cytotoxic, antidiabetic and gastrointestinal effects. The current research will describe the antifungal and antioxidant effects of different parts of *Chenopodium album* weeds. Different extract at different concentrations show the maximum and minimum effectiveness against fungal phytopathogens causes several diseases. On the behalf of results, we conclude that in place of fungicides, we can use *Chenopodium* extract at lower concentrations.

***Keywords*:** *Chenopodium album*, Antioxidant activity, Antifungal activity and Phytopathogens.

Introduction

Chenopodium album (L.) member of the family *Chenopodiaceae* (Goosefoot family) belongs to the genus *Chenopodium.* It is also known as fat-hen, Bathua, Vastukah, Chakvit. *C. album* is a fast-growing, vegetable weedy annual plant. This weedy plant has a mixture of medicinal applications. It is a polymorphous, erect herb. It is 3.5m in height and found wield in altitude of 4,700 m. The herb is a common weed in both seasons summer and winter in waste places and commonly grow in the field of wheat, barley, mustard and gram, also reduce their acquiesce. The gentle shoots are use to eat as a raw in salad or with gravy; they are also cooked as a vegetable or used as an ingredient in breakfast material. The leaves eaten as a vegetable either steamed or cooked like spinach, but in self-control because of high level of oxalic acid (Johnson *et al.,* 1995), whereas in Europe and North America, it is commonly regard as a weed in places such as potato fields (Grubben and Denton, 2004). The dried out leaves of *Chenopodium* can also be built-in in a hodgepodge of conventional food items as it can look up the dietetic worth of the work of art as well as add multiplicity in the diet (Singh *et al.,* 2007). Plants foreigner in Eastern Asia is integrated under *C. album* but often be at variation from European specimen (Germplasm Resources). *C. album* is very well-to-do in healthy nutrients and minerals also Due to its high nutritive importance and medicinal properties; *C. album* is used in the grounding of many long-established medicines. In India, Bathua is used as a stuff to prepare many edible items such as sag, chapati and shake.

From ancients, time-honored medicinal plants have been notorious to possess sundry biological commotion as antimicrobial, analgesics, anticancer, antipyrexial, and antihypertensive activity and an important source of many biological active compounds (Inatani *et al.,* 1996; Webster *et al*., 2008). The prosperous content of antifungal substances in plants is being worn biopesticide since up to the beginning of human civilization. Antifungal possessions of plant and plant products emerge evidently every day. Antifungal substances which are obtained from plants have no side outcome against environment thus, bountiful a significant advantage. Nowadays, a profitable pesticide used against plant diseases is originated to cause smash up to environment and human health. The most interesting area of relevance for medicinal plant extracts is the inhibition of augmentation and reduction in numbers of the pathogens (Okolo *et al*., 1995).

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The antifungal and antioxidant effects of *Chenopodium album* L. was determine through extracts different concentration in basic media by applying radial methods, whereas antioxidant probable of *Chenopodium album* was evaluated through two different techniques, *i.e.* DPPH assay, FRAP assay. In this research we are try to conclude that all parts showed good to satisfactory antifungal and antioxidant results and in future we try to replace chemical fungicides from natural fungicides made from weeds.

Material and Methods

Sample collections

Weeds samples were collected in sterile zip lock bags from various nearby locations such as Siwaya and Daurala villages and agriculture farms in Modipuram, Meerut.

Extract preparation

For extract preparation firstly we shade dry the weeds samples and then ground crush by pistal and mortar to convert in powder form and then take a particular amount of sample and solvent at the ratio of 1:10. Extract was prepared by using apparatus soxhlet assembly.

Isolation of fungal phytopathogens

Fungus were isolated from the infected part of the Bengal gram crop on potato dextrose agar media (Basic media) by using autoclave at 121°C at 15 psi.

Activity of weed extract on fungal phytopathogens

Antifungal activity: To determine the antifungal activity we use radial methods technique. In this method we prepare PDA (potato dextrose agar media) and partially divided in three flasks or beaker then we adds the weeds extract at different concentration (5%, 10% and 15%) in each flask to made volume at 100ml beside control. After completing this process we shake the flask properly then pour in well labeling petriplate equally and allowed for solidification for 15 to 20 minutes. When the plates were solidify then cut the disc of fungal culture at the size of 6 mm by using cork borer and put on the surface of solidifying media petriplates each as well as control also, then incubates all the plates at 28°C for 6 to 7 days, whenever the control was not filling completely.

Antioxidant activity of weed extracts by different methods

By DPPH methods: DPPH (2,2-diphenyl-1-picryl-hydrazyl-hydrate) free radical manner is an antioxidant on electron-transfer based process that produces a violet way out in ethanol (Mensor *et al.,* 2001). This free radical firm at room temperature is compact in the existence of an antioxidant molecule, giving rise to colorless ethanol solution. Uses of the DPPH assay provide an effortless way to estimate antioxidants by spectrophotometry, so it can be constructive to assess various goods at a time.

Antioxidant activity percentage of (AA%) of each substance was assess by DPPH free radical assay. DPPH radical measurement scavenging activity was performed described by methodology Brand-Williams. The samples were reacted with the stable DPPH radical in an ethanol solution. The reaction mixture consisted of adding 0.5 mL of sample, 3 mL of absolute ethanol and 0.3 mL of DPPH radical solution 0.5 mM in ethanol. When DPPH reacts with an antioxidant compound, which can donate hydrogen, it is reduced. Color turn (from deep violet to light yellow) was recorded at 517 nm Absorbance after 100 min of reaction using a UV-VIS spectrophotometer (Brand *et al.,* 1995).

By FRAP methods: The ferric reducing ability of studied plant materials was assessed following the method described by Benzie and Strain (Benzie and Strain, 1996). The final results were articulated and having ferric reducing ability equivalent to that of 1 mM FeSO4, particularly expressed as mol Fe(II) equivalent/g sample in dry weight.

Result and Discussion

Chenopodium album is a multi property weedy plant. All parts of this weed show effectiveness due to the presence of activated compound, who responsible for the positive results. Antioxidant test measure by respectively methods likes-FRAP & DPPH patterns. All three parts show the result in this pattern. Comparative analysis of seed, stem & leaf by FRAP & DPPH was shown in figure 1. Antifungal activeness of *Chenopodium album* weed extracts was measure by radial methods by using different parts, applying many organic solvent extracts in different concentrations. The observation revealed that the different extracts in the various solvent shows that all the extracts inhibit the growth of the soil borne fungal phytopathogens in case of *Chenopodium album* leaves the methanol extract at maximum concentration taken 15% (mixed in media) in this work, showed up the fungal growth 49.17% of *Rhizoctonia solani* at as compare to control 333.76%. Along with that Ethyl acetate extract in increasing concentrations (15%) showed up the fungal growth 63.48% of *Sclerotium rolfsi* as compare to control *i.e.* 201.67%. Butyl alcohol extract showed the fungal growth 55.74% growth of *Rhizoctonia solani* as compare to growth *i.e.* 255.36%. Benzene extract of *Chenopodium* leaf at 15% concentration showed growth 58.67% of *Fusarium oxysporium* as compare to control *i.e.* 275.63%. Water extract of *chenopodium* leaf at

15% extract concentration showed up the growth 68.97% of *Sclerotium rolfsi* as compare to control *i.e.* 266.27%**.**

When we investigate the study about the *Chenopodium* seed extracts at different concentration (*i.e.* 5%, 10% and 15%). The methanol extract of *Chenopodium* seed at 15% concentration showed up the growth 28.81% of *Sclerotium rolfsi* as compare to control *i.e.* 295.11%. Ethyl acetate of *Chenopodium* seed at 15% extract concentration showed up the growth 66.76% of *Sclerotium rolfsi* as compare to control *i.e.* 193.42%. Butyl alcohol extract of *Chenopodium* seed 10% and 15% concentration showed the lower growth of *Rhizoctonia solani* as compare to control *i.e.* 280.11%. The benzene extract of *Chenopodium* seed at 15% extract concentration showed up the growth 44.24% of *Sclerotium rolfsi* as compare to control *i.e.* 266.31%. Water extract of *Chenopodium* seed at 15% extract concentration showed up the growth 68.97% of *Sclerotium rolfsi* as compare to control *i.e.* 266.50%.

Conclusion

On the behalf of overall result and discussion we conclude that when we increase the concentration of every or all extract in a particular ratio, the fungal growth was reduce in culture plate *i.e.* extract treated media at particular concentration 5% then 10% and last 15% show effect on soil borne fungal phytopathogens and then over the surface of pertiplate the growth was appear reduce when we increase the concentration of extract. At the end we conclude the 15% extract concentration of both part of *Chenopodium album* reduce the growth of all the soil borne fungal phytopathogens but the most effective fungus which are highly effective from *Chenopodium album* extract are *Sclerotium rolfsi* then *Rhizoctonia solani* and at the end *Fusarium oxysporium*.

Acknowledgement

The authors would like to thank Shobhit Deemed University, LPU University and specially thanks to DRDO for their support in the present work.

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Table 1: Antioxidant activity of *Chenopodium album* by FRAP & DPPH methods

S. No.	Abbreviation of Samples	Full Form of Samples	FRAP (µM/L) ± SD	DPPH (%) ± SD
1.	CS	*Chenopodium Seed*	*0.553 ± 0.04*	*44.87 ± 0.04*
2.	*CST*	*Chenopodium Stem*	*0.454 ± 0.07*	*46.87 ± 0.03*
3.	*CL*	*Chenopodium Leaf*	*0.489 ± 0.10*	*53.42 ± 0.03*

Note: SD = Standard Deviation; µM/L = Micro mole/liter

Table 2: Antifungal activity of *Chenopodium* leaf extracts on fungal phytopathogens

S. No.	Extracts	Concentration	Fungal		
			Fusarium oxysporium	***Rhizoctonia solani***	***Sclerotium rolfsi-***
1.	Methanol	5%	109.18%	73.79%	119.30%
		10%	81.52%	65.80%	112.84%
		15%	69.70%	49.17%	65.71%
		C%	264.47%	268.64%	333.76%
2.	Ethyl acetate	5%	154.66%	149.57%	120.95%
		10%	111.33%	127.20%	70.00%
		15%	88.28%	88.08%	63.48%
		C%	281.46%	239.65%	201.67%
3.	Butyl alcohol	5%	182.52%	89.13%	141.00%
		10%	137.54%	71.27%	117.60%
		15%	107.27%	55.74%	114.49%
		C%	242.19%	255.36%	221.99%
4.	Benzene	5%	81.67%	202.84%	101.64%
		10%	72.51%	79.48%	93.87%
		15%	58.67%	64.87%	66.24%
		C%	275.63%	265.33%	223.11%
5.	Water	5%	99.22%	254.84%	138.86%
		10%	88.13%	255.62%	96.70%
		15%	101.00%	260.94%	68.97%
		C%	248.23%	263.97%	266.27%

Table 3: Antifungal activity of *Chenopodium* seed extracts on fungal phytopathogens

S. No.	Extracts	Concentration	Fungal phytopathogens		
			Fusarium oxysporium	***Rhizoctonia solani***	***Sclerotium rolfsi-***
1.	Methanol	5%	131.08%	192.31%	76.03%
		10%	111.43%	194.82%	49.07%
		15%	113.38%	167.84%	28.81%
		C%	382.09%	310.35%	295.11%
2.	Ethyl acetate	5%	164.68%	222.27%	131.61%
		10%	140.25%	175.78%	110.09%
		15%	106.62%	127.64%	66.76%
		C%	211.47%	227.94%	193.42%
3.	Butyl alcohol	5%	150.54%	77.73%	88.92%
		10%	104.76%	0.00%	107.94%
		15%	44.24%	0.00%	67.95%
		C%	288.69%	280.11%	283.18%
4.	Benzene	5%	123.12%	137.77%	111.43%
		10%	106.34%	96.99%	95.44%
		15%	98.13%	96.99%	44.24%
		C%	294.01%	193.95%	266.31%
5.	Water	5%	0.844393	230.40%	131.07%
		10%	92.78%	236.50%	106.28%
		15%	88.92%	239.21%	107.84%
		C%	238.62%	255.76%	266.50%

Table 4: Comparative evolution of *chenopodium album* weed leaf extracts against fungal phytopathogens

S. No.	Fungal phytopathogens	EXTRACT IN DIFFERENT SOLVENTS				
		Methanol	**Ethyl acetate**	**Butyl alcohol**	**Benzene**	**Water**
1.	*Fusarium*	8.68E-01	1.18E+00	1.42E+00	7.10E-01	7.21E-01
2.	*Rhizoctonia*	6.29E-01	1.22E+00	7.21E-01	1.16E+00	2.57E+00
3.	*Sclerotium*	9.93E-01	8.48E-01	1.24E+00	8.72E-01	1.02E+00

Table 5: Comparative evolution of *chenopodium album* weed seed extracts against fungal phytopathogens

S. No.	Fungal phytopathogens	EXTRACT IN DIFFERENT SOLVENTS				
		Methanol	**Ethyl acetate**	**Butyl alcohol**	**Benzene**	**Water**
1.	*Fusarium*	1.19E+00	1.37E+00	9.98E-01	1.09E+00	8.87E-01
2.	*Rhizoctonia*	1.85E+00	1.75E+00	2.59E-01	1.24E+00	2.29E+00
3.	*Sclerotium*	5.13E-01	1.03E+00	8.83E-01	8.37E-01	1.15E+00