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Pathological parameters of Cabbage (*Brassica oleracea* var. *capitata*) Seed

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***Abstract*-- Plants are the gift of the nature for all living organisms(Chakraborti, S. (2004). Most of needs of survival can be fulfilled by plants like food, shelter, clothes, oxygen, medicine, cosmetics and many others. Without the plants we could not imagine our life. Plants are having secondary metabolites i.e. alkaloids, glycosides, tannins, resins, gum and many other biochemicals which are used in the medicine for curing different types of ailments. Every plant is having unique bioactive compounds.**

In the present study ten very common wild medicinal plants were selected from study region. These selected medicinal plants root biomass produced by each plant studied and the chemical screening of root biomass in the form of TPC (Total phenol content) was determined(Yubedee, A. G., 1998; Mahanasundari and K. Prabhakar, 2005). In the study region cabbage is common vegetable cultivated. Hence cabbage seeds were selected for further study and higher yield(Bhat R, et al, 2017). Effect of root biomass on seed mycoflora, seed germination, growth of seeds born fungi, dry mycelial weight, sporulation parameters were determined(Neergaard, P. (1973).Many fungi found on the seeds of cabbage out of which three very common seed borne fungi were isolated and brought into pure culture. Selected seed borne fungi of cabbage were used for the further experimental study (Bhajbhuje, 2014).

I. INTRODUCTION

Plants are having unique secondary metabolites which used in the medicine, cosmetics, immune boosting, flavorant, colourant and different properties. In the present study plant biomass were utilized for the welfare of agriculture.

The huge plant biomass may be utilized as the source of insecticides, herbicides, fungicides and bactericides etc. considering these facts attempts were made to determine biomass of the medicinal plants. The biochemicals present in these plants may be the great reservoirs of new and potential drugs. Considering these aspects, attempts were made to study total phenol content (TPC) of some common medicinal plants in the study region (Mahadeven and Sridhar in 1996).

The studies of huge biomass in the form of root extracts of the selected medicinal plants were used for the welfare of Cabbage vegetable crop (Bhajbhuje MN, 2015).

For this ten very common and easily available medicinal plants in the nearby area were selected for their root biomass.

The seeds of Cabbage vegetables were treated with biomass in the form of root extracts and its effects on seed mycoflora, seed germination and seedling emergence was studied (Ghotekar and Hedawoo, 2010). The common and dominant seed borne fungi were also grown in the plant biomass extract and their spore germination, growth and sporulation were studied. Biomass of most of the medicinal plants was found to be inhibitory for the seed borne fungi and promoted seed germination, seedling emergence of the cabbage vegetable (Gangopadhyay and Nirenberg, 1975). The useful conclusions were drawn are reported.

II. MATERIALS AND METHODS:

Studies on biomass production of the medicinal plants:

During the present studies ten very common and easily available medicinal plants were selected. The fresh roots of the selected medicinal plants were collected. The collected each plant material was washed and cleaned separately. 100gm of fresh plant material was weighed. The weighed plant material was dried in the hot air oven. The dried plant material was reweighed .The dry biomass of the medicinal plants was determined by subtracting the dry weight from the fresh weight. The resulted weight in gm/100gm was treated as the biomass produced by the selected medicinal plants.

Total phenol content (TPC) of the root biomass of the medicinal plants:

Total phenol content (TPC) of the biomass of the test medicinal plants was estimated by using Folin- Ciocalteu method as described by Mahadeven and Sridhar in 1996. For this 1ml of the alcoholic extract of biomass of the test medicinal plants was taken in a graduated test tube. 1ml of Folin–Ciocalteu reagent and 2ml of sodium carbonate (Na_2Co_3) solution was added to the test tube. The test tube was well shaken and heated in a boiling water bath for exactly one minute. The test tubes were placed under running tap water for cooling.

The blue colored solution in the test tube was diluted to 25ml with distilled water and the absorbance was measured at 650nm in a colorimeter. The unknown were read from a standard curve made from different concentrations of catechol. A blank containing all the reagents minus alcoholic extract of biomass of the test medicinal plants was used to adjust the absorbance to zero (Yubedee, A. G., 1998)

Preparation of alcoholic extract of Biomass of medicinal plants:

For this the biomass of the test medicinal plants was cut into pieces of 1-2cm immediately plunged them in boiling ethyl alcohol and allowed to boil for ten minutes. 10ml of alcohol was used for every gm tissue. The extraction was made on top of a hot plate under a hood. The extract was cooled in a pan of cold water. The tissues of the biomass were crushed thoroughly in a mortal pestle and passed through two layers of cheese cloth and re- extracted the ground tissues for three minutes in boiling 80% alcohol using 3ml of alcohol for every gm of tissue. The extract was cooled and passed through cheese cloth and filtered through Whatman No. 1 filter paper. The volume was raised with 80% alcohol, to represent 10ml of extract for every gm of tissue used. This extract was used as alcohol extract of the biomass of the test medicinal plants (Z.A.M. Baka, 2015).

Moist blotter plate method:

The isolation is made by blotter test method as described by International Seed Testing Association (ISTA, 1966), De Tempe (1970), Neergaard (1973) and Agarwal and Sarbhoy (1978).A pair of white blotter papers of 8.5 cm. diameter was jointly soaked in sterile distilled water, placed in presterilized borosil petriplates of 10 cm diameter. Ten seeds of the cultivars were placed at equal distance on the moist blotters. More than four hundred seeds were screened for each treatment. The plates were incubated in the culture room at normal room temperature for one week. On the seventh day the seeds were examined under stereoscopic microscope for the preliminary determination of the many fungal species. Identification and further confirmation of twelve different species of fungi occurred on the seeds was made by preparing slides of the fungal growth and observing under compound microscope. Out of these three fungi identified species (*Alternaria*sp; *Drechslera* sps; *Fusarium* sps) were maintained on PDA slants in the form of pure culture for further studies.

Collection of Seed Samples:

Seed samples of the cabbage were collected from different places like field, store houses and market places. A composite seed sample of individual test vegetable was prepared by mixing the individual samples together, preserved in gunny bags at room temperature during the studies (Jha D. K., 1993).

Identification of seed borne fungi:

Seed borne fungi were primarily identified by preparing the slides on the basis of sporulation characters. Detailed observations of fungi were under the compound microscope. Their identification was confirmed and compared with the help of latest manuals (Subramanian, 1971; Jha, 1993 and Mukadam, 1997). Identified fungi were brought under pure cultures. These maintained on the PDA slants in the culture room.

Preparation of spore suspension:

After seven days incubation sporulated slant cultures of seed borne fungi added 10 ml of sterile distilled water. The slants were shaken and the content was filtered through muslin cloth. The filtrate was used as spore suspension.

Study of spore germination:

During the present studies, 25ml of GN medium supplemented separately with 2ml of 5% plant extract was poured in 100ml borosil conical flasks.These flasks were incubated for twenty four hours in the culture room. After incubation the spore germination was studied by preparing slides of the incubated solution and observing under the compound microscope.The flasks containing with 25ml of GN medium without the addition of 2ml of 5% plant extract with spore suspensions of test fungi were served as control (Tahvonen and Avikainen, 1987).

Screening of growth and sporulation of seed borne fungi:

During the present studies some common and dominant seed borne fungi of vegetables (P. Harbola, 2002) like *Alternaria tenuis, Drechslera longirostrata and Fusarium oxysporum* were grown in GN medium supplemented separately with 2ml of five percent plant root extracts of medicinal plant biomass for seven days at room temperature. After incubation contents of the flasks were filtered through pre-weighed Whatman filter paper No. 1. The filter papers with mycelial mat were oven dried for twenty four hours at sixty degree centigrade and reweighed.

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Growth of the seed borne fungi in terms of dry mycelial weight was measured by subtracting the initial weight of the filter paper from the final weight of filter paper with mycelial mat.

Seed borne fungi without addition of root extract were act as a control. Sporulation was determined by preparing the slides (**Nishikawa, J. et al, 2014**).

III. Result And Discussion

Table 1:
Studies on production and total phenol content (TPC) of root biomass of The test medicinal plants. (Dry weight basis)

Sr. No.	Botanical Name	Root biomass (gm/100gm)	TPC (mg/gm)
01.	*Abrus precatorius* L.	47	1.0
02.	*Aegle marmelos* (L.) Corr.	62	0.9
03.	*Balanites aegyptica* Delile.	52	0.8
04.	*Datura metel* L.	38	1.1
05.	*Dioscorea bulbifera* L.	48	1.1
06.	*Helicteres isora* L.	44	0.7
07.	*Sapindus laurifolius* Vahl.	52	0.9
08.	*Semecarpus anacardium* L.	48	1.4
09.	*Solanum xanthocarpum* Schra.	33	1.2
10.	*Vitex negundo* L.	47	0.6

It is clear from the result presented in the Table no. 1 that the root biomass of *Aegle marmelos* (L.) Corr. (62 gm/100gm) was found to be more and root biomass of *Solanum xanthocarpum* Schra. (33gm/100gm) was found less as compared to other test medicinal plants.

It is also found that the Total phenol content (TPC) of the root biomass of test medicinal plants *Semecarpus anacardium* L. (1.4mg/gm) was found more and TPC of *Vitex negundo* L. (0.6 mg/gm) as compared to other test medicinal plants.

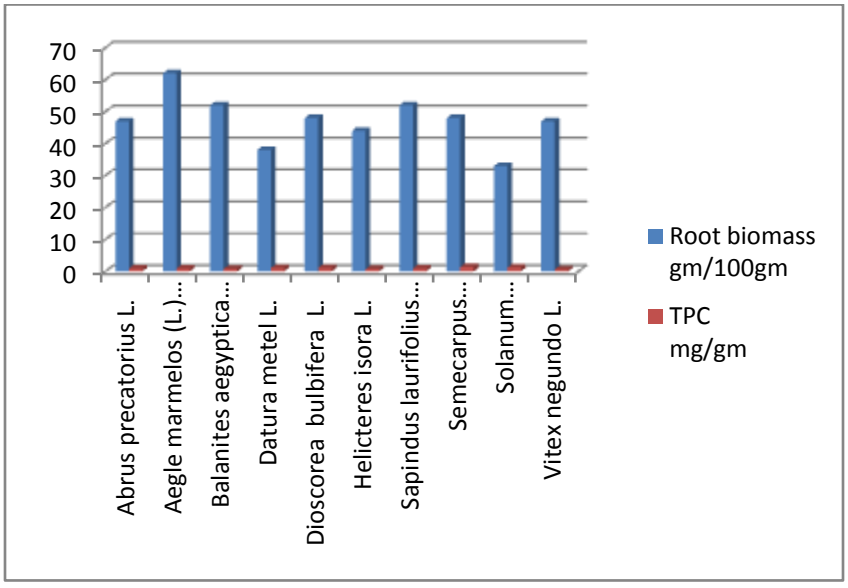

Fig. no. 1: Showing Total biomass and TPC of selected medicinal plants

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Table 2:
Effect of root extract of selected medicinal plants on the seed mycoflora and seed germination of Cabbage.

Sr. No.	Extract of root biomass	Incidence of seed mycoflora (%)	Seed germination		
			%	RL (mm)	SL (mm)
01.	*Abrus precatorius* L.	16	85	38	29
02.	*Aegle marmelos* (L.) Corr.	23	75	35	28
03.	*Balanites aegyptica* Delile.	38	78	30	25
04.	*Datura metel* L.	17	84	40	30
05.	*Dioscorea bulbifera* L.	29	63	35	26
06.	*Helicteres isora* L.	32	68	28	25
07.	*Sapindus laurifolius* Vahl.	18	83	42	32
08.	*Semecarpus anacardium* L.	12	92	35	20
09.	*Solanum xanthocarpum* Schra.	14	88	32	26
10.	*Vitex negundo* L.	48	60	20	16
	Control	70	63	30	25

RL= Root length, **SL**= Shoot length

It is found from the result presented in Table no.2 that the roots extract of *Semecarpus anacardium* (12%)and*Solanum xanthocarpum* (14%)were found to be more inhibitory for the incidence of seed mycoflora. The seeds of Cabbage soaked in root extracts of these two plates showed much reduced incidence of seed mycoflora while the Cabbage seeds soaked in root extract of *Vitex negundo* showed more incidence (70%) of seed mycoflora as compared to the root extract of other test medicinal plants (Jogi M.G et al, 2010).

It was interesting to note that the root extracts of all the test medicinal plants were found to be inhibitory for the incidence of seed mycoflora in more or less degree(Ghotekar and Hedawoo, 2010).

It is evident from the results that the seeds of Cabbage showed more germination in the root extract of *Semecarpus anacardium* (92%). The root extracts of *Vitex negundo*(60%) found to be inhibitory for seed germination, root and shoot elongation as compared to the root extracts of other test medicinal plants (SonaliMeena et al, 2022; Madavi and Bhajbhuje, 2014).

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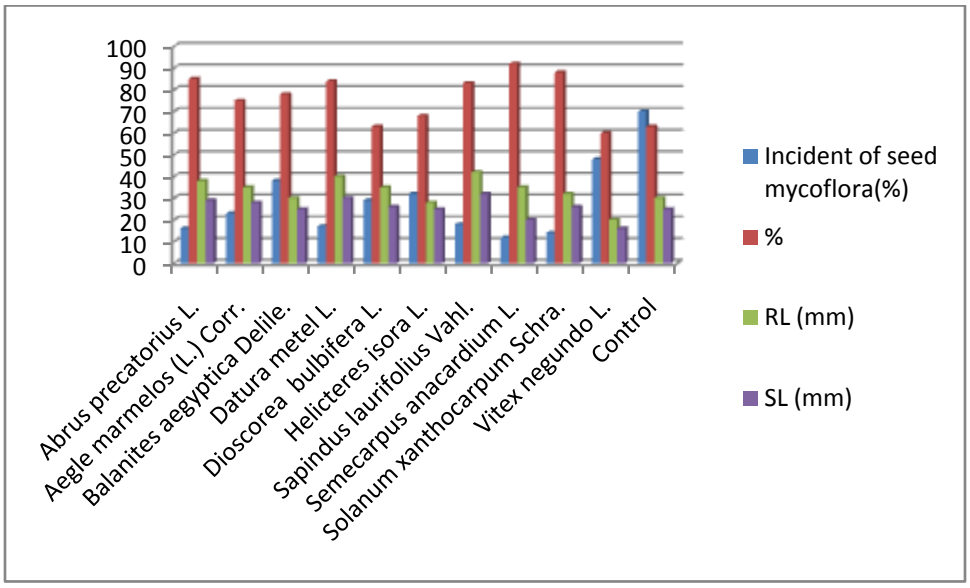

Fig. no. 2: Incident of seed mycoflora and seed germination of cabbage seeds

Table 3:
Effect of root biomass of selected medicinal plants on spore germination, growth and sporulation of selected seed borne fungi of cabbage

Sr. No	Extract of root biomass	*Alternaria tenuis*			*Fusarium oxysporum*			*Drechslera longirostrata*		
		SGP (%)	**DMW (mg)**	**SPL**	**SGP (%)**	**DMW (mg)**	**SPL**	**SGP (%)**	**DMW (mg)**	**SPL**
01	*Abrus precatorius* L.	43	38	++	36	32	++	31	29	++
02	*Aegle marmelos* (L.) Corr.	46	35	++	34	35	++	35	31	++
03	*Balanites aegyptica* Delile.	52	37	+++	37	39	+++	39	35	+++
04	*Datura metel* L.	41	33	++	31	33	++	29	27	++
05	*Dioscorea bulbifera* L	45	36	++	39	34	++	33	33	++
06	*Helicteres isora* L.	52	40	+++	41	38	++	41	31	++
07	*Sapindus laurifolius* Vahl.	48	38	+++	43	39	+++	38	28	++
08	*Semecarpus anacardium* L.	16	22	+	12	25	+	14	13	+
09	*Solanum xanthocarpum* Schra.	18	25	+	14	29	+	15	16	+
10	*Vitex negundo* L.	55	41	+++	47	43	+++	42	38	+++
	Control	90	52	+++	83	45	+++	75	62	+++

SGP: Spore germination (%), **DMW**: Dry Mycelium wt. (mg), **SPL**: Sporulation

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It is clear from the results presented in table-3 that, the root extract biomass of all test medicinal plants was found to be inhibitory for spore germination, growth and sporulation of *Alternaria tenuis*, *Fusarium oxysporum* and*Drechslera longirostrata.* It is also evident from the results that the root extract of *Semecarpus anacardium*(16%, 12% and 14%)was found to be more inhibitory and the root extract of *Vitex negundo* (55%, 47% and 42%)was found to be less inhibitory for the spore germination of *Alternaria tenuisFusarium oxysporum* and*Drechslera longirostrata* respectively as compared to root extract of remaining test medicinal plants (Z.A. M. Baka, 2015; Bhajbhuje M. N., 2015).

It is evident from the results presented in table-3 that, the root extract biomass of all test medicinal plants was found to be inhibitory for growth in the form of dry mycelial weight of *Alternaria tenuis*, *Fusarium oxysporum* and *Drechslera longirostrata.* It is also found from the results that the root extract of *Semecarpus anacardium*(22mg, 25mg and 13mg) was found to be more inhibitory and the root extract of *Vitex negundo (*41mg, 43mg and 38mg) was found to be stimulatory for the growth in the form of Dry mycelial weight (DMW) of *Alternaria tenuisFusarium oxysporum* and *Drechslera longirostrata* respectively as compared to root extract of remaining test medicinal plants (De Tempe, 1970; Jogi MG et al, 2010).

It is evident from the results presented in table-3 that, the root extract biomass of all test medicinal plants was found to be inhibitory for sporulation of *Alternaria tenuis*, *Fusarium oxysporum* and *Drechslera longirostrata.* It is also found from the results that the root extract of *Semecarpus anacardium* (+) and *Solanum xanthocarpum* (+)were found to be more inhibitory and the root extract of *Vitex negundo* (+++) and *Helicteres isora*(+++) were found to be very less inhibitory for the sporulation of *Alternaria tenuis,Fusarium oxysporum* and *Drechslera longirostrata* respectively as compared to root extract of other test medicinal plants (Z.A.M. Baka, 2015, Neergaard P. 1973).

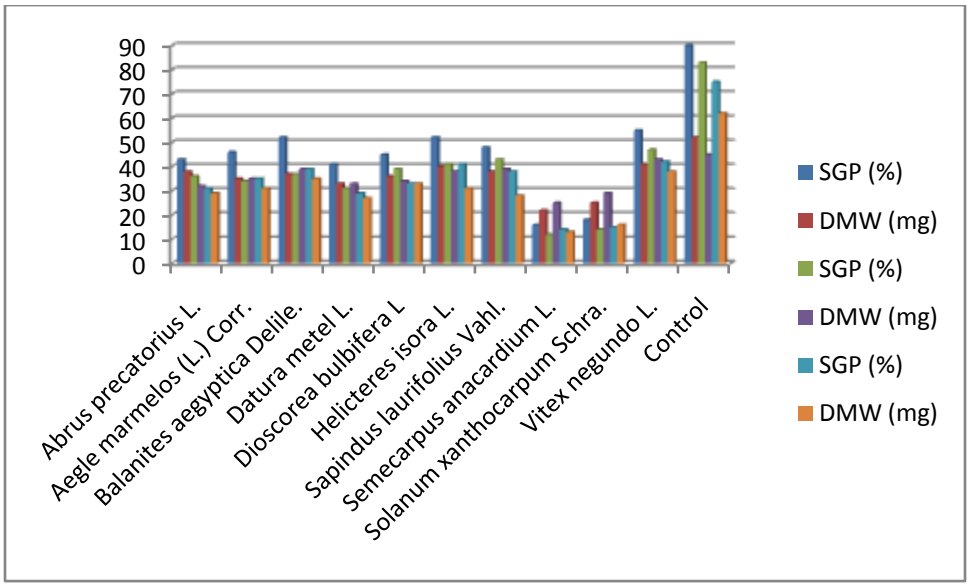

Fig. no. 3:Spore germination percentage and dry mycelial weight of selected seed borne fungi

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Fig. no, 4: Seed mycoflora, seed germination of Treated and untreated seeds of cabbage