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FUNGAL ASSOCIATION AND DETERIORATION OF CHEMICAL CONSTITUENTS OF *CULLEN CORYLIFOLIA* (LINN.) MEDIK. SEEDS

P. S. KABNOORKAR AND S. S. DEOKULE

Department of Botany, University of Pune, Pune – 411 007, India

In the present study, total 14 fungi were found associated with stored samples of *C. corylifolia* seeds such as, *Aspergillus niger, A. parasiticus, A. elegans*, *Rhizopus stolonifer*, *A. flavus, Chaetomium globossum, A. oryzae, Fusarium* sp., *Ch. spirale, Curvularia* sp., *A. terreus*, *Alternaria* sp., *Penicillium rubrum* and *Trichurus spiralis*. Out of these 14 fungi, *Aspergillus niger* and *A. parasiticus* showed highest % incidence while minimum % incidence recorded in case of *Penicillium rubrum, Alternaria* sp., & *Trichurus spiralis.* The drug stored under the influence of different relative humidities *viz*. 33, 55, 75, 96 and 100% showed variation in % of occurrence as well as biodeterioration of the chemical constituents such as sugars, proteins, phenols and glycosides. The drug stored under 96 and 100% RH showed maximum deterioration of chemical constituents.

Key words: chemical constituents, deterioration, fungi, % incidence.

The plant *Cullen corylifolia* (Linn.) Medik (= *Psoralea corylifolia* L.) commonly known as 'Bavchi' belongs to family 'Fabaceae' (Kirtikar and Basu 1999). The drug has been considered to be so efficacious in leprosy that it was given the name of 'Kushtanashini' means 'leprosy destroyer' (Nadkarni 1927). Seeds are used as antipyretic, anthelmintic, alexeteric. It is good for heart troubles, asthma, leucoderma, urinary discharges, heals, ulcers. It possesses purgative, stimulant and aphrodisiac properties. It improves appetite and good for scabies and biliousness. It cures the blood diseases (Kirtikar and Basu 1999). The seeds have some repute in native medicine as a remedy for certain skin diseases. *Psoralea* is recommended in the treatment of leprosy, psoriasis and inflammatory diseases of the skin (Kokate *et al.* 2002).

During harvesting, collection and storage these drugs may be contaminated with fungi. A few reports are available which support our study (Dutta and Roy 1987, Roy *et al*. 1987, Inman 1962, Marx *et al*. 1966, Wagner 1977, Rose, 1981, Maheshwari, 1987, Al-Juraifani, 2011, Sareen *et. al*., 2010, and Anyanwu, 2010). But the available information is very meager. Therefore, it has been decided to study the fungal association and deterioration of chemical constituents of *Cullen corylifolia* seeds under the influence of different relative humidity.

MATERIAL AND METHODS

The seeds of '*Psoralea*' were collected from different storehouse/ kashataushdis of Pune. It was brought to the laboratory in separate polyethylene bags to avoid aerial contamination. Blotter test method, as recommended by International Seed Testing Association (1966) was adopted for isolation of fungi. Agar plate method and surface washing methods were also used. The seeds were sterilized with 2% NaOCl solution before plating. In order to evaluate the chemical changes in relation to fungi associated, the samples were stored in small muslin cloth bags under different RH levels i.e. 33, 55, 75, 96,100 % and at 28 3C temperature for 90 days (Wink and Sears 1950). At an interval of 15 days, samples were taken out and washed thoroughly in 100 ml sterilized glass distilled water. After that calculate the % incidence of fungi and then washed samples were dried in oven for chemical analysis. The changes take place in percentage of sugars, proteins, phenols and glycosides in the samples were estimated by

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the methods of Nelson (1941), Lowry *et al.* (1951), Singh *et al*. (1978) and Kokate *et al*. (2002).

The % incidence of fungi was calculated by using the following formula –

No. of colonies of a particular species x 100
Total no. of colonies of all the species

RESULTS AND DISCUSSION

14 fungal species were found to be associated with '*Psoralea*' seeds in varying percentages such as *Aspergillus niger*(19.2%), *A. parasiticus*(14.0%), showed higher % incidence followed by *A. elegans*(8.7%), *Rhizopus stolonifer*(8.7%), *A. flavus*(7.0%), *Chaetomium globossum*(7.0%), *A. oryzae*(5.2%), *Fusarium* sp. (5.2%), *Ch. spirale*(5.2%), *Curvularia* sp.(5.2%), *A. terreus*(5.2%), *Alternaria* sp.(3.5%), *Penicillium rubrum*(3.5%) and *Trichurus spiralis*(1.7%).

Seeds of *C. corylifolia* were stored under different relative humidity and observed the deterioration of sugar in each relative humidity (Table 1). The drug stored under 75 % RH after 15 days of incubation TS (Total sugar), RS (Reducing sugar) and NRS (Non reducing sugar) observed were 11.5, 5.1 and 6.4 % reduction and it shows more deterioration after 90 days of incubation period i.e. 9.8, 4.3 and 5.5 %. The drug stored under 96, 100 % RH, after 90 days of storage recorded maximum reduction in sugar contents.

Seeds of *C. corylifolia* contain 5.88 % total protein, this value decreases to 3.88 % results was depicted in Table 2. The drug stored at 75 % RH showed the gradual decrease in the protein value 5.04, 4.64 and 4.24 % while in 96 % RH showed 4.8, 4.32 and 3.96 % declination of protein after 30, 60 & 90 days of storage. In 100 % RH observed the maximum deterioration of protein i.e. after 30 days (4.76 %), 60 days (4.2 %) and 90 days (3.88 %), respectively.

The total phenol in *C. corylifolia* was estimated to be 2.9 %. This value of phenol was deteriorated to 1.65 % under the influence of different relative humidity (Table - 3).

C. corylifolia seeds contain 2.75 % of glycoside (Table - 4). The drug stored at 75 % relative humidity observed 2.69 % of deterioration after the storage of 15 days. At 30, 60 and 90 days observed the 2.65, 2.56 and 2.50 % loss in glycoside while the drug stored at 96 %

RH recorded the gradual decrease in values of glycoside i.e. 2.67, 2.63, 2.57, 2.54, 2.51 and 2.48 %, after the storage of 15, 30, 45, 60, 75 and 90 days. Lastly the drug stored at 100 % RH also observed reduced value of glycoside. After the incubation of 30, 60, 90 days of storage it showed 2.61, 2.52, 2.45 % of deterioration of glycoside, respectively.

Analysis of variance shows that the effects of relative humidity and incubation periods in the reduction of sugars, proteins, phenols, and glycosides contents were significant at 1 % level of significance.

CONCLUSIONS

The fungi isolated from seeds of '*C. corylifolia*' in various % incidence spoils the seeds severely and ultimately affects the deterioration of chemical constituents. During the storage (1 to 90 days and 33 to 100% RH) from the biochemical-analysis of '*Psoralea*' seeds it was observed that 75, 96 and 100% RH showed the significant reduction in the sugars, proteins, phenols and glycosides contents. The seeds stored at 33 and 55% RH showed minimum deterioration of chemical constituents. The maximum storage period is also responsible for the maximum association of fungi.

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Table 1. Deterioration of sugar (mg/100mg) in seeds of *C. corylifolia* under storage at different relative humidity.

ation Days	Control			33%			55%			75%			96%			100%		
	TS	RS	NRS	TS	RS	NRS	TS	RS	NRS	TS	RS	NRS	TS	RS	NRS	TS	RS	NRS
1	11.8	5.3	6.5	11.8	5.3	6.5	11.8	5.3	6.5	11.8	5.3	6.5	11.8	5.3	6.5	11.8	5.3	6.5
% Change over control	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15	11.8	5.3	6.5	11.8	5.3	6.5	11.8	5.3	6.5	11.5	5.1	6.4	11.3	5	6.3	11.1	4.9	6.2
% Change over control	0	0	0	0	0	0	0	0	0	2.5	3.7	1.5	4.2	5.6	3.0	5.9	7.5	4.6
30	11.8	5.3	6.5	11.8	5.3	6.5	11.8	5.3	6.5	11.1	4.9	6.2	10.9	4.8	6.1	10.7	4.7	6
% Change over control	0	0	0	0	0	0	0	0	0	5.9	7.5	4.8	7.6	9.4	6.1	9.3	11.3	7.6
45	11.8	5.3	6.5	11.8	5.3	6.5	11.8	5.3	6.5	10.7	4.7	6	10.5	4.6	5.9	10.4	4.5	5.9
% Change over control	0	0	0	0	0	0	0	0	0	9.3	11.3	7.6	11.0	13.2	9.2	11.8	15	9.2
60	11.8	5.3	6.5	11.8	5.3	6.5	11.8	5.3	6.5	10.3	4.5	5.8	10.1	4.4	5.7	10.1	4.3	5.8
% Change over control	0	0	0	0	0	0	0	0	0	12.7	15.0	10.7	14.4	16.9	12.3	14.4	18.8	10.7
75	11.8	5.3	6.5	11.8	5.3	6.5	11.8	5.3	6.5	10	4.4	5.6	9.7	4.2	5.5	9.6	4	5.6
% Change over control	0	0	0	0	0	0	0	0	0	15.2	16.9	13.8	17.7	20.7	15.3	18.6	24.5	13.8
90	11.8	5.3	6.5	11.8	5.3	6.5	11.8	5.3	6.5	9.8	4.3	5.5	9.5	4.1	5.4	9.2	3.9	5.3
% Change over control	0	0	0	0	0	0	0	0	0	16.9	18.8	15.3	19.4	22.6	16.9	22.0	26.4	18.4

LSD (P = 0.01) TS – Inc. Period – 0.000708, Relative humidity – 1, 99 E -06
RS - Inc. Period – 0.000793, Relative humidity – 1, 09 E -06
NRS - Inc. Period – 0.00076, Relative humidity – 5.02 E -08

Table 2. Deterioration of protein (mg/100mg) in seeds of *C. corylifolia* under storage at different relative humidity.

Incubation Days	Control	33%	Control	55%	Control	75%	Control	96%	Control	100%
1	5.88	5.88	5.88	5.88	5.88	5.88	5.88	5.88	5.88	5.88
% Change over control	0	0	0	0	0	0	0	0	0	0
15	5.88	5.88	5.88	5.88	5.88	5.6	5.88	5.4	5.88	5.12
% Change over control	0	0	0	0	0	4.7	0	8.1	0	12.9
30	5.88	5.88	5.88	5.88	5.88	5.04	5.88	4.8	5.88	4.76
% Change over control	0	0	0	0	0	14.2	0	18.3	0	19.0
45	5.88	5.88	5.88	5.88	5.88	4.84	5.88	4.52	5.88	4.4
% Change over control	0	0	0	0	0	17.6	0	23.1	0	25.5
60	5.88	5.88	5.88	5.88	5.88	4.64	5.88	4.32	5.88	4.2
% Change over control	0	0	0	0	0	21.0	0	26.5	0	28.5
75	5.88	5.88	5.88	5.88	5.88	4.44	5.88	4.12	5.88	4.04
% Change over control	0	0	0	0	0	24.4	0	29.9	0	31.2
90	5.88	5.88	5.88	5.88	5.88	4.24	5.88	3.96	5.88	3.88
% Change over control	0	0	0	0	0	27.8	0	32.6	0	34.0

LSD (P = 0.01) – Inc. Period – 0.000738, Relative humidity – 2.34 E -06

Table 3. Deterioration of phenol (mg/100mg) in seeds of *C. corylifolia* under storage at different relative humidity.

Incubation Days	Control	33%	Control	55%	Control	75%	Control	96%	Control	100%
1	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9
% Change over control	0	0	0	0	0	0	0	0	0	0
15	2.9	2.9	2.9	2.9	2.9	2.55	2.9	2.5	2.9	2.95
% Change over control	0	0	0	0	0	12.0	0	13.7	0	-1.7
30	2.9	2.9	2.9	2.9	2.9	2.35	2.9	2.4	2.9	2.85
% Change over control	0	0	0	0	0	18.9	0	17.2	0	1.7
45	2.9	2.9	2.9	2.9	2.9	2.2	2.9	2.15	2.9	2.5
% Change over control	0	0	0	0	0	24.1	0	25.8	0	13.7
60	2.9	2.9	2.9	2.9	2.9	2	2.9	1.95	2.9	2.25
% Change over control	0	0	0	0	0	31.0	0	32.7	0	22.4
75	2.9	2.9	2.9	2.9	2.9	1.95	2.9	1.75	2.9	1.9
% Change over control	0	0	0	0	0	32.7	0	39.6	0	34.4
90	2.9	2.9	2.9	2.9	2.9	1.9	2.9	1.7	2.9	1.65
% Change over control	0	0	0	0	0	34.4	0	41.3	0	43.1

LSD (P = 0.01) – Inc. Period – 0.001791, Relative humidity – 1,16 E -05

Table 4. Deterioration of glycoside (mg/100mg) in seeds of *C. corylifolia* under storage at different relative humidity.

Incubation Days	Control	33%	Control	55%	Control	75%	Control	96%	Control	100%
1	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75
% Change over control	0	0	0	0	0	0	0	0	0	0
15	2.75	2.75	2.75	2.75	2.75	2.69	2.75	2.67	2.75	2.66
% Change over control	0	0	0	0	0	2.1	0	2.9	0	3.2
30	2.75	2.75	2.75	2.75	2.75	2.65	2.75	2.63	2.75	2.61
% Change over control	0	0	0	0	0	3.6	0	4.3	0	5.0
45	2.75	2.75	2.75	2.75	2.75	2.6	2.75	2.57	2.75	2.55
% Change over control	0	0	0	0	0	5.4	0	6.5	0	7.2
60	2.75	2.75	2.75	2.75	2.75	2.56	2.75	2.54	2.75	2.52
% Change over control	0	0	0	0	0	6.9	0	7.6	0	8.3
75	2.75	2.75	2.75	2.75	2.75	2.53	2.75	2.51	2.75	2.49
% Change over control	0	0	0	0	0	8	0	8.7	0	9.4
90	2.75	2.75	2.75	2.75	2.75	2.50	2.75	2.48	2.75	2.45
% Change over control	0	0	0	0	0	9.0	0	9.8	0	10.9

LSD (P = 0.01) – Inc. Period – 0.000673, Relative humidity – 4, 56 E -07

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