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Estimation of Changes in the Phenols and Protein Content of *Leucaena leucocephala* (Lam.) de Wit Seeds due to Biodeterioration under Different Relative Humidity and Incubation days

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Leucaena leucocephala, deterioration, relative humidity, incubation days, phenols and protein.

ABSTRACT

L. leucocephala is a medicinally important tree species. Since it is a long-lived tree having nutritious forage and variety of other uses *viz.*, firewood, timber, human food, green manure, shade and erosion control, it is well known by the name of miracle tree. In the present study seeds of *Leucaena leucocephala* were analyzed for quantitative changes in proteins and phenols content of seeds due to spoilage fungi under different relative humidity *viz.*, 10%, 34%, 56% and 74% RH for 30days of incubation. The prolong storage period and association of mycoflora and their growth continuously reduce the chemical constituents of plant produce. The product stored at higher relative humidity (56% and 74%RH) favoured for maximum deterioration of proteins and phenols.

INTRODUCTION

Leucaena leucocephala belongs to the family Fabaceae and it is a medium sized fast growing tree. The tree has many uses like firewood, timber, greens, fodder, green manure, provides shade and controls soil erosion (Gardezi et al. 2004). The seeds may also be used as a potential source of commercial gum (Azeemoddin et al. 1988; Buckeridge et al. 1987). Various parts of *L. leucocephala* have been reported to have medicinal properties ranging from control of stomach diseases to contraception and abortion and the seed gum has been reported to be useful as a binder in tablet formulation (Deodhar et al. 1998; Verma and Balkishem 2007). Gamal Eldeen et al. (2007) has reported that sulfated glycosylated form of polysaccharides from the seeds possessed significant cancer chemopreventive and anti-proliferative activities. Also, an amino acid mimosine was reported from the seeds which possessed anticancer activity (Chang et al. 1999). Other studies on the extracts of the seeds had shown varying activities including central nervous system depressant, anthelmintic and antidiabetic activities (Ademola et al. 2005; Syamsudin et al. 2010).

Since all the raw materials used in pharmaceutical preparations has to be stored in storage godowns or storage bins after the harvesting and one need to take extra care against the post harvest losses associated with the microbial contamination of the crude product. In fact post harvest and storage spoilage of crude herbal drugs by moulds is one of the most

important threats associated with production of herbal medicines in terms of quality deterioration and mycotoxin contamination (Roy 2003; Dubey et al. 2008). Therefore, the quality and safety of herbal preparations are also of great concern (Abba et al. 2009).

MATERIAL AND METHODS

Seeds of *Leucaena leucocephala* were collected from the forest nursery, AFRI, Jodhpur. Collected seed samples were stored in small plastic boxes (with upper lid perforated) at different relative humidity by means of saturated solutions of various inorganic salts *viz*., $Cacl_2$ (fused) (10%); Nacl (74%), $CaNO_3.4H_2O$ (56%) and $Cacl_2.6H_2O$ (34%) and control for 30 days in the room temperature. The Agar plate method as recommended by International Seed Health Testing Association (1966) was performed for isolation of mycoflora associated with the seeds. The samples were taken out at an interval of 15 days and fungi associated with them were identified. Some samples were taken out from each treatment and were used for biochemical analysis.Quantitative estimation of protein was carried out by standard procedure described by Lowry et al. (1951), total phenols by Swain and Hillis (1959) and carbohydrates by Dey (1990).

RESULTS AND DISCUSSION

Fungus isolated from the seeds of *Leucaena leucocephala* under different relative humidity was *Aspergillus* sps. During the period of storage (1 day to 30 days and under 10 to 74% RH) biochemical analysis of seed stored at 10% RH showed minimum deterioration of chemical constituents. Data of seeds sample stored under different relative humidity and incubation days for observation of change in total phenol content at 10% RH, after 15 days of incubation period was 8.982 mg g^{-1} which decreased to 7.899 mg g^{-1} under RH 74% in comparison to control where total phenol content was 9.616 mg g^{-1} (Table 1). The value of phenol content further abridged at 30 days of incubation in each sample. Reduction in total protein content after 15 days of incubation period was 6.461 mg g^{-1}, 6.051, 5.874 and 5.662 mg g^{-1} at 10, 34, 56 and 74% RH as compared to control

Table 1. Deterioration of chemical constituents (mg g^{-1}) *Leucaena Leucocephala* seeds under different relative humidity

Deterioration of Phenol content (mg g^{-1}) Leucaena Leucocephala seeds under different relative humidity					
Incubation	Control	10% RH	34%RH	56% RH	74% RH
Days					
15	9.616± 0.316	8.982± 0.408	8.840± 0.404	7.948± 0.334	7.899± 0.575
30	9.383± 0.252	8.881± 0.434	8.494± 0.407	7.215± 0.572	7.407± 0.335
Deterioration of Protein content (mg g^{-1}) *Leucaena Leucocephala* seeds under different relative humidity					
15	6.652± 0.619	6.461± 0.488	6.051± 0.129	5.874± 0.129	5.662± 0.231
30	6.652± 0.619	6.377± 0.468	5.914± 0.191	5.827± 0.118	5.621± 0.252

Note: Data are the mean of three replicates
± Standard error

wherein total protein content was found to be 6.652 mg g^{-1}. These values reduced further, after 30 days of incubation period.

The product stored at higher relative humidity (56% and 74% RH) favoured for maximum deterioration of proteins and phenols in the present study. Data analysis indicated that the deterioration of total phenol and proteins contents is under the influence of incubation days and relative humidity.

Changes in chemical constituents may be due to active interference of fungi in breakdown of constituents and utilization by them. Several workers have been showed deterioration of chemical constituents under storage due to spoilage of fungi in different plants (Deokule and Kabnoorkar 2008; Kabnoorkar and Deokule 2009; Dutta and Roy 1987, Bilgarmi et al. 1978, Roy et al. 1987; Inman 1962).

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