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RESEARCH ARTICLE

STUDY OF THE POLLEN PROTEINS IN TWO CASSIA SPECIES FROM INDUSTRIALLY POLLUTED AREA OF NAGPUR

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ABSTRACT

In order to determine the effect of air pollution on protein content of pollen, two species of Cassia viz. *C. siamea* L. and *C. fistula* L. were studied from industrial area of Nagpur (MIDC, Hingna). Civil lines area was considered as control area. Pollen proteins were extracted, and analyzed by SDS PAGE method. Total protein content of pollen extracts was measured by method of Lowry et. al. (1951). Our investigations revealed noticeable differences in protein contents. According to observations more bands for protein were obtained for samples from control area as compared to samples from polluted area. Variations in protein contents were correlated with industrial pollution.

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INTRODUCTION

Nowadays industrial pollution is one of major air pollution. Plants growing in such areas are affected by the harmful pollutants present in polluted air released by different industries. The air around us is not free from pollutants. When we inhale this polluted air many allergic disorders occur. Polluted air contains many air borne bio-pollutants such as microorganisms, pollen grains, fungal spores, hyphae of fungi, insects debris, mites etc. Among all these agents, pollen grains and fungal spores are the most predominant allergens in the air of Nagpur (Kalkar and Patil, 1994 and Kalkar et al., 1998). Pollen grains are well known to be common causative agents in respiratory allergic disorders (Rawat et al., 2000, Gioulekas et al., 2004, D'Amato et al., 2005). The allergy caused by the pollen is due to the presence of certain allergens which are protein and glycoprotein that are capable of eliciting the formation in susceptible humans of specific skin-sensitizing through the body immune system (Knox 1979, Batanero et al., 1995). *Cassia siamea* and *Cassia fistula* are dominant avenue trees found abundantly in experimental area. The present study pertains to estimation and characterization of proteins from pollen extracts of *Cassia siamea* and *Cassia fistula* by SDS-PAGE method (Sodium Dodecyl Sulfate-Polyacrylamide Gel Electrophoresis)

MATERIALS AND METHODS

Protein content was determined by Lowry et al. (1951) using Bovine Serum Albumin (BSA) as standard. Extracted proteins

Were separated by 10% SDS-Polyacrylamide Gel Electrophoresis (1µl of each pollen sample per well) and detected by Coomassie blue staining (Sadavivam and Manickam, 2001).

RESULTS AND DISCUSSION

The Protein Content was found to be 0.78 and 0.61 in *Cassia siamea* whereas in *Cassia fistula* it was 1.0 and 0.81 (Table 1). Results of SDS-PAGE of these two pollen samples have shown four and seven bands of proteins in industrial area and control area *C. siamea* of have shown respectively whereas *C. fistula* pollen extracts of industrial and control area have shown four and five bands of proteins respectively (Table 2, Fig.1). It was noticed from the results that some of the proteins were lost or disintegrated in industrial area. The reason may be due pollution in the area. It has been demonstrated that gaseous and particulate pollutants might influence pollen allergenic proteins in molecular structure, quantity and release (Behrendt and Becker, 2001). Pollen particles contain pollinic allergens. High environmental humidity conditions can subject the pollen particles to osmotic shock, resulting in the release of microparticles or paucimicronic particles that may contain allergenic proteins (Suphioglu et al., 1992). Researchers showed that air pollution could cause collapse and thinning of the exine, and changes in total protein content and electrophoretic profile (Majd and Mohamadi, 1992; Behrendt et al., 1997; Pelter, 1998; Emberlin, 1998 and 2000). Pollen morphological studies (LM and SEM) of *Cassia fistula* and *Cassia siamea* in polluted area have shown shrinkage, breakage of exine with particulate matter attached on surface

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(Kalkar and Jaiswal, 2014). Studies on *Lagerstroemia indica* have shown a reduction in total protein content and a subsequent lower staining intensity of proteins under air pollution conditions (Rezanejad *et al.*, 2003). The rapid industrialization in most of the major cities of our country together with the heavy vehicular exhausts makes it very difficult to properly diagnose the causative agent of respiratory disorders (Parui *et al.*, 1998).

Table 1. Protein content of pollen extracts (mg/ml)

Sr No	Sample	Area	Protein content
1	<i>Cassia siamia</i>	Control	0.78
2	<i>Cassia siamia</i>	Industrial	0.61
3	<i>Cassia fistula</i>	Control	1.0
4	<i>Cassia fistula</i>	Industrial	0.81

Table 2. Results of SDS-PAGE electrophoresis showing bands of proteins (kDa) in experimental materials

Well No	Sample	Area	No. of band	Molecular weight (In kDa)
1	<i>Cassia siamia</i>	Control	7	90.8, 76.8, 64.4, 42.5, 33.21, 27.3, 20
2	<i>Cassia siamia</i>	Industrial	5	90.8, 76.8, 64.4, 42.5, 33.21,
3	<i>Cassia fistula</i>	Control	5	97.4, 76.8, 64.4, 42.5, 33.21
4	<i>Cassia fistula</i>	Industrial	4	97.4, 64.4, 42.5, 33.21

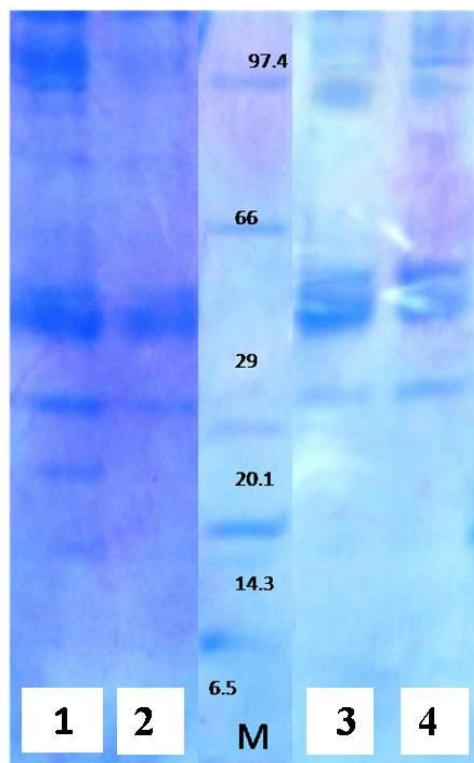


Figure 1. SDS- PAGE report of pollen samples (1 - & 2- Cassia siamia, 3 & 4 - Cassia fistula, M- Protein marker)

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