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# Study Of Glass Transition And Crystallization Kinetics In Fiber Reinforced Phenol Formaldehyde Composites Of Leptadenia Pyrotechnica Of Bikaner

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***Abstract***

*Importance of composite materials is seen in all age of history and all ancient civilizations have used such materials. The main objective of this study is to prove the industrial use of local plants found in desert area. The study provides useful parameters for fiber industry so that material can be used properly for particular application and can compete the international market. By these parameters we try to develop understanding for usefulness of new natural fiber composite material with respect to exiting plastic material. The knowledge said parameters are useful for understanding the microscopic level study. The theory, models and equipment used are accepted under international standards. By the proposed work we investigate phase transformation, some thermal properties of fiber reinforced phenol formaldehyde composites of Leptadenia pyrotechnica .It is planned to investigate strength, phase transformation and some thermo physical properties of composite materials in respect of polymer made by plastics. Leptadenia pyrotechnica (Hindi: [khai) is the botanical name of a desert herb of the family Asclepiadaceae. It is known as him pin Hindi and Urdu, "Khipp". Being highly brought-resistant, leptadenia pyrotechnica has played an important role in the desert afforestation programs. The herb khimpis a strong soil- binder and as such is one of the pioneer species in sand dune fixation. Only a few workers have done work on composite of fibers of desert plant and since plants are able to survive under extreme weather conditions, their composites are expected to provided good result. Fiber reinforcement plastics are commonly used by modern electronic industry, and, since the disposal is not easy for such fiber reinforced plastics, the development of fiber reinforced plastics that harmonized with environment ie demanded [1]. Form such a viewpoint, some researchers have been studying to use the natural fiber, which it has a moderate mechanical property and is a green material as a reinforcement of the conventional fiber reinforced plastic [2,3] However, since generally the strength of natural fiber is lower than that of the glass fiber etc. , it is necessary to produce a green composite with higher fiber content and longer fiber length in order to obtain a natural fiber reinforced composite material with high strength. Which natural fibers are obtained, appropriate atmospheric carbon dioxide during their growth, which is released during the combustion of natural fibers. Hence incineration of natural fibers reinforced composites lead to positive carbon credits and lower global warming effect [7].the properties of natural fibers we want determine, keep in mind that one is dealing with natural product with properties that are strongly influenced by their growing environment. Temperature, humidity, the composition of the soil and the air all affect the height of the plant, strength of its fibers density, etc. and the way by which plants, are harvested and processed result in a variation of propertied [8].'' Crotalaria burhia' is found in desert of western rajasthan the fibers obtained in these have many advantages like eco-friendly, easy process-able, low cost, non toxic, abundance in nature, low density high strength etc.*

***Keyword:*** *Leptadenia pyrotechnica, Asclepiadaceae, Fiber reinforcement plastics.*

## 1. INTRODUCTION

A much branched often leafless, erect shrub ,8-10 dm high .Stem erect slender, terete ,twiggy green, straight ,more or less puberulent, particularly the young parts ,the branches divaricating, opposing in leaf axils .Leaves 4.7*0.3-0.35 cm , linear or linear-lanceolate, acute ,more or less leathery,puberulent on both surfaces (glabrous in FPB). Densely so beneath; subsessile or on 1 mm long , terete petioles , erect or suberect when young ,drooping at length , ultimately falling ;midrib slightly raised below ; lateral, umbellate ,pubescent cymes ;penduncle 5-10 mm long. Pubescent. Galyx 1.5 mm long,divided to about the middle. Pubescent; segments ovate-deltoid ,acute .corolla 3 mm long, divided to near the base; tube 1-1.5 mm long ,glabrous , funnel –shaped ;lobes ovate-oblong ,obtuse ,thickened towards the apex , yellow and pubescent inside ; corolla ;pubescent at apex ; stamina corona minute , annular ,close to the base of the stamina coumn which is very short; pollen masses erect, with pellucid apex ; caudicles short . Ovary glabrous , 1 mm long , many –ovuled , Follicles 10-13 *0.5 -0.7 cm ,terete,lanceolate, attenuated into a long, slender beak , slightly narrowed at the base glabrous. Seeds 8 mm long, narrowly lanceolate, glabrous; coma 2.5-3.5 cm long,

Field notes: A typical species found on sand throughout the area

Fl: Aug-Dec; Fr:Nov-March.

Local name: Khimp , Khimparo .

Herbarium specimens examined: JODHPUR:

1526 , 1798 ;King 296492-296498 (CAL);Vasvani , s.n. ;BARMER ;Rolla 66915 (BSI) ; JAISALMER ; Rolla 67064 ,67 136 (BSI) ; King (296498 CAL ,.Jodhpur ,1867 ) ,identified as Orthanthera viminea (?) , below here .

Therefore, it is important to develop a new creative technology for the composite material that fills these demands [4]. Natural fiber composites are emerging as realistic alternatives to glass- reinforced composites in many applications. Natural fiber composites such as hemp fiber-epoxy, flax fiber-polypropylene (PP), and china reed fiber- PP are particularly attractive in automotive applications because of lower cost and lower density. [5]. Natural fibers traditionally have been used to fill and reinforce thermo-sets, natural fiber reinforced thermoplastics, especially polypropylene composites, have attracted greater attention duteto their added advantage of recyclability [6]. Natural fibers theoretically result in no net addition to CO2 emissions

**LEPTADENIA PYROTECHNICA**
**Kingdom:** plantae
**Class:** Angiosprmae
**Family:** Asclepiadaceae
**Sub family:** Asclepidoideae
**Genus:** Leptadenia
**Species:** Reticulata
**Botanical Name:** ***Leptadenia pyrotechnica***
**Hindi Name: [khai**
**Urdu Name: Khipp**
***Leptadenia pyrotechnica in BIKANER (Rajasthan)***

## 2. REVIEW OF WORK ALREADY DONE ON THE SUBJECT

Recently many types of natural fibers have been investigation for use in plastics including flax, hemp, jute straw, wood, rice husk, wheat, barley, oats, rye, cane (sugar and bamboo), grass, reed, kenaf, ramie, oil palm empty fruit bunch, sisal, coir, water, hyacinth, leaf fiber and papyrus [10]. Wambua et al.bridged the gap and investigated the response of flax, hemp and jute fabric reinforced polypropylene composites to ballistic impact by fragment simulation projectiles [11]. Thermoplastics rainforced with special wood fillers are enjoying rapid growth due to their many advantages. Lightweight reasonable material, because of their thermoplastic properties [9]. Wheat gulten is unique among cereal and other plant proteins in its ability to form a cohesive blend with viscous properties once plasticized. For biodegradable films or packing materials [12]. Mwaikambo et al.studied hemp is a baste lingo cellulosic fiber, comes from the plant cannabis sativa and has bee used as reinforecement in biodegradable composites [13]. Henaf, hibiscus cannabinus L, amember of hibiscus family is traditionally, hemp has been used to make ropes but these days its fiber is used to make item such as clothing toys and shoes. The fiber is fully biodegradable, is non-toxic and may be recycled [14]. Flax fibers are potentially outentially outstanding reinforcing filters in thermoplastic bio-composites containing thermoplastics and modified fiber-basrd thermoplastic (LLDPE/HDPE) composites [15]. Hornsby et al. [16-17] wheat straw has been usrd for making composites, panel boards and anion exchangers where the straw is used in powder form than in the fibrous from. Panthapulakkal et al.[18].has processed and characterized wheat straw fibers to evaluate their potential as reinforcing material for thermoplastic fiber to evaluate their potential as reinforcing material for thermoplastic composites. Jute is also one of the most common agro fibers used as a reinforcing componnenet for thermoplastics and thermosetting matrices [19-20]. Bamboo is an abundant natural source in asia and south America and has been used to develop bamboo reinforced thermosetting plastic (epoxy and polyester) [21-22]. Okubo et al. have fabricated bamboo fiber eco-composites for ecological purpose with the conventional hot press method and conclude that hight weight content of bamboo fiber enabled the bamboo composites to increase their strength in the most effective way, when the bamboo fiber was modified into the cotton shap [23]. The water yielding cacity, capillarity etc of cellulosic plant fibers such as sisal, bowstring hemp (dagger), pineapple, lady's finger and betel-nut annealed from 310 to 430 k have been investigated and found that rate of absorption of water content at constant relative humidity increases on pre-heating. And the water-yielding capacity as well as capillary action at constant relative humidity decreases with increase in annealing temperature [24]. The thermal conductivity of the banana fiber reinforced polyster composites with increased percentage of glass, fiber, decreases in comparison to composite of pure banana fiber is minimum when glass fiber fraction is 11% in the composite . increase in thermal conductivity at 15% of glass fiber can be attributed to a change in the energy dissipation mechanism [25]. Pineapple leaf fiber reinforced phenol formaldehyde (PF) composites have been studies by transied by transient plane source (TPS) technique and found thermal conductivity by effective thermal diffusivity of the composites decrease, as compared with pure PF as the fraction of fiber loading increases [26]. The thermo-physical behavior of hybrid pineapple leaf fiber (PALF) and glass fiber reinforced polyester composites has been also evaluated the results show that chemical treatment of the fiber reduces the composite thermal contact resistance. Hybridization of natural fiber with glass

allow a significantly better heat transport ability of the composite [27]. Surface of pineapple leaf fiber (PALE) was pre-treated with sodium hydroxide and modified with two different functionalities found bthat young's modulus is the highest in the case of the PALE/n NAOH composites also showed the highest tensile strength and impact strength and thermal stability of the composites is lower than that of neat polycarbonate resin and thermal stability decreased with increasing pineapple leaf fiber countent [28]. Measurement of effective thermal diffusivity and specific heat of kair fiber reinforced phenol formaldehyde composites have been studies by transient plane source (TPS) technique and found that values of effective thermal conductivity and effective thermal fiffusivity of the composites decrease, as compared to pure phenol formaldehyde, as the fraction of fiber loading increases [29].

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