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A RESEARCH NOTE ON ALBINISM IN *AZADIRACHTA INDICA* A.JUSS.

P. PRABAKARAN* AND K. KUMARAN

DEPARTMENT OF FOREST BIOLOGY AND TREE IMPROVEMENT, FOREST COLLEGE AND RESEARCH INSTITUTE, TNAU, METTUPALAYAM – 641 301.

Corresponding author's e-mail: pprabufcri @gmail.com

ABSTRACT:

Albino seedlings appear during the process of natural regeneration of *Azadirachta indica* were reported here. These albinic individuals are not able to survive long term due to lack of chlorophyll pigment. In the present study, we report neem albino seedlings, among the 34 progenies five progenies viz., TN-MTP-16, TN-MTP-21, TN-MTP-35, TN-MTP-42 and KA-BGL-01 are produced albino seedlings at 3 %. This may due to immature seeds or environmental factors or mutations that have occurred between seed formation and germination stage.

KEYWORDS: *Albino, Neem, Progeny, Chlorophyll.*

INTRODUCTION:

The neem tree (*Azadirachta indica* A. Juss.) is a tropical evergreen tree native to the Indian sub-continent. Neem belongs to the family of Meliaceae and considered as one of the multipurpose trees, most of the plant parts such as fruits, seeds, leaves, bark, and roots contain compounds with proven antiseptic, antiviral, antipyretic, anti-inflammatory, antiulcer and antifungal uses. This can act as pest repellents in organic farming. These multifaceted biological effects and pest enable neem products to control more than 200 different species of insects. Neem Seeds have considerable economic significance due to a variety of commercial usages. Quality of Seed determines the commercial value. One tone of neem seed is processed; it gives 1.5 Kg of Azadirachtin 200 kgs of neem oil and 780 kg of neem cake.

The term albinism derived from Latin word which means white. Lack of chlorophyll pigment, but can take various forms depending on the severity of pigment loss, as well as the nature of the missing pigments. The variation in environmental conditions such as light, temperature, media composition and culture conditions play some role in determining the frequency of albino plant formation. Genetic factors are even more important and are major determinants in albinism (Kumari et al., 2009; Kumaran et al., 2007).

METHODOLOGY:

Thirty four plus trees are identified and seeds collected from various parts of Tamil Nadu and Karnataka during June - July. It was sown in soil substratum based on high azadirachtin content (above 0.8%) at Forest College and Research Institute, Tamil Nadu Agricultural University, Mettupalayam. Seeds are treated with cold water at 4 hrs for pre-sowing treatment and directly sown in polybags and seed germination was observed regularly to calculate germination percentage and albinism seedling (14 - 25 DAS germination starts).

RESULT AND DISCUSSION:

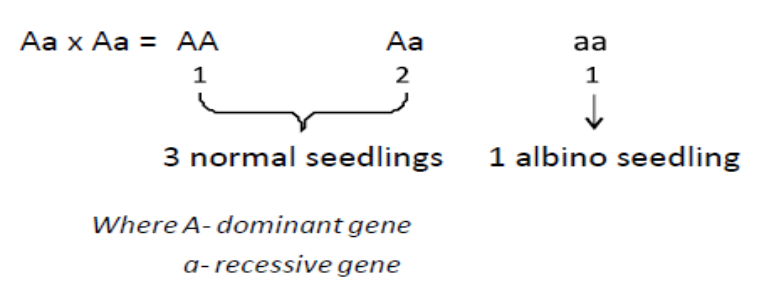
In the present study, seeds were collected from various parts of Tamil Nadu and Karnataka during June-July. It was sown based on high azadirachtin content (above 0.8 %) at the nursery of Forest College and research institute, Tamil Nadu Agricultural University, Mettupalayam (11^{o}19'N, 76^{o}56'E, 300 meters MSL, Rainfall 800 mm, pH 7.1). the polybags were filled with red soil and vermicompost mixture in the ratio of 2:1 and seedling behavior were observed regularly to calculate germination percentage (14 - 25 DAS germination starts). Totally 34 progenies were evaluated out of these five progenies (TN-MTP-16, TN-MTP-21, TN-MTP-35, TN-MTP-42, and KA-BGL-01) are reported albinism in seedling at 3 percentage. After 30 days, albino seedlings turned into pale yellow colour and died (Table 1 and Plate 1). This may due to partial or complete loss of chlorophyll pigments and incomplete differentiation of chloroplast membranes that in turn loss of photosynthesis process and plant die at young stage (Kumari *et al.*, 2009). The leaf and shoots show a wide range of coloration to the difference in photosynthetic pigment content that may have a direct effect on the photosynthetic rate. So albino seedlings are lack of chlorophyll, they do not survive a long time and the food reserves stored in the endosperm/ cotyledons are exhausted affected seedlings were died (Gunaga *et al.*, 2013).

The term 'albinism' is derived from the Latin word 'Albus', which means 'white'. Albinism is defined as a lack of pigmentation but can take various forms depending on the severity of pigment loss, as well as the nature of the missing pigments. Environmental conditions such as light, temperature, media composition, and culture conditions play some role in determining the

frequency of albino plant formation. Genetic factors are even more important, and are major determinants in albinism (Kumari *et al.*, 2009).

Albinism is normally lethal for the plants as photosynthesis is hampered. Depending on the level of chlorophyll deficiency, the duration of survival after regeneration varies. However, in a rare occurrence, the redwood (*Sequoia sempervirens*) albinos can parasitize their parent tree by root grafting to survive and even reach a height of over 20 m (Davis and Holderman 1980). In ornamental plants, it is considered a novelty, and efforts are made to preserve these plants. But most reports include a note on the number of days to which albino seedlings survive making it clear that they ultimately die a premature death.

Albino is largely documented in angiosperms and which a product of recessive trait governed by many loci. Albinism is caused due to the inheritance of recessive alleles (alternative form of governed by many loci. Albinism is caused due to the inheritance of recessive alleles (alternative form of a gene), either from a single parent (very rare) or from both the parents. As the majority of leaf pigments are in plastids, it is clear that albinism involves dramatic alterations to chloroplast biogenesis.



Most of the research in this area has found that albino plants have altered plastid ultrastructure as compared to their green counterparts (Clement *et al.*, 2005). Besides, mutation whether induced or spontaneously, albino seedlings may be produced either by selling of an albino carrier (Aa) or by the mating of albino carriers. In both cases, the results may be as depicted below.

However, under natural conditions, the frequency of such seedlings will vary depending on the extent of natural selfing or mating of albino carriers, reduced population size, the high degree of inbreeding, reduction in heterozygosity and spontaneous mutation (Gunaga *et al.*, 2013). Rao *et al*. (1999) noted an interesting observation that seeds collected from a particular locality showed albinism in resultant seedlings of *Artocarpus integrifolia*. In the current study, albinism may be caused due to environmental factors or mutations that have occurred between seed formation and germination stage. Most studies conducted to find the inheritance of albinism have found that it is a recessive trait governed by one or two genes with two alleles; albinism being recessive. The albino mutants may be an important material for functional studies and may lead to gene discovery, this is difficult to identify at seed stage unless otherwise seed germination only finds it. Future studies, seedlings can be used as a genetic marker for the estimation of natural mating and selfing in the species.

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Table 1. Comparison between neem normal and albino seedlings 30 days after sowing

Source code	Type of plant						Remarks
	Normal seedling			Albino seedling			
	Shoot length (cm)	Root length (cm)	No. of leaflet	Shoot length (cm)	Root length (cm)	No. of leaflet	
TN-MTP-16	14.50	11.50	3.00	10.50	7.50	2.00	Affected seedling are Abnormal white and pale yellowish leaves, due to absence of chlorophyll
TN-MTP-21	12.00	10.50	4.00	8.00	6.20	3.00	
TN-MTP-35	15.50	9.50	2.00	7.50	7.00	2.00	
TN-MTP-42	15.00	9.00	4.00	8.50	5.50	2.00	
KA-BGL-01	11.50	12.00	3.00	8.00	6.00	3.00	

Normal and Albino seedling

Albino seedling

Plate 1. Albinism in neem seedling at nursery stage