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## **A Report On The Threat Of *Leucaena Leucocephala* Lam Dewit. On infrastructure: A Case Study Of Adeyemi College Of Education, Ondo, Nigeria**

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**Abstract:**

*Leucaena leucocephala* Lam de Wit is an invasive species reported in the IUCN data base. The plant is native to Mexico but the literature on its introduction to Nigeria is not available. Probably it could have been through International Agro forestry. *Leucaena leucocephala* is used as shade trees for cocoa, coffee and tea and generally acts as shelter belt, providing shade and wind protection for a variety of crops. It is used as fire wood. The plant is a good soil improver because of its high nitrogen fixing potential. Despite the functional uses of this plant, it is an invasive species. *Leucaena leucocephala* has been reported to be suitable as an ornamental and road side land scapping species but caution must be exercised because of its invasive nature. This paper therefore reports on the negative impact of *L. leucocephala* on infrastructures. The plant reduces the aesthetic value of structures, weakens foundations, block drainages e.t.c. The position of this paper is that these plants must be checked before they exert deleterious effects on structures. We must create awareness of the destructive tendency of *L. leucocephala* on structures and the need to checkmate their invasion.

**Key words:** *Leucaena leucocephala*, invasive, infrastructures, destructive tendency.

**Introduction**

*Leucaena leucocephala* Lam de Wit is an invasive species reported in the IUCN data base. The plant is native to Mexico but the literature on its introduction to Nigeria is not available. Probably it could have been through International Agro forestry as reported as reported in other parts of the continents. (Invasion Biology, 2007).

*Leucaena leucocephala* has a number of functional uses. It is used as shade trees for cocoa, coffee and tea and generally acts as shelter belt, providing shade and wind protection for a variety of crops. It is used as fire wood which burns readily with little smoke and make excellent charcoal. The plant is a good soil improver because of its high nitrogen fixing potential; the pinnate leaves decompose quickly, providing short time influx of nutrients (Bekele-Tesemma et al., 1993 and Bein, 1996).

It is used as forage to livestock. The leaves have a high nutritive value (high palatability, digestibility, intake and crude protein (Lim,)).

Despite the functional uses of this plant, it is an invasive species. IUCN noted that *L. leucocephala* has been widely introduced because of its beneficial qualities but it has become an aggressive invader in disturbed areas in many tropical and sub tropical locations. It is cited as 1/100 of World's worst invasive Alien species. The trees form dense mono-specific thickets which are difficult to eradicate once it is established. This renders the extensive areas unusable, inaccessible and threatens native plants.

**Invasive Characteristics Of *Leucaena Leucocephala***

1. Its precocious year round flowering and fruiting, abundant seed production, self fertility, hard seed coat confers on it the ability for invasiveness.
2. Regrowth is easy. *Leucaena leucocephala* is well adapted to fire and can grow from burnt stumps. Lam (2006) reported that it regenerates easily from basal shoots after fire. It is also drought resistant (Swasdiphanish, 1992).
3. It is well adapted to a wide variety of soil types include mildly acidic soils (Ph > 5.2).
4. The long taproot system could grow down into depth of 5metres to exploit underground water (Brewbaker *et al.*, 1972).
5. The plant produces acidic mimosine which is poisonous to other species (Matthews and Brandt, 2006). The acid destroys forest margins and cultivated areas which threatens biodiversity (James, 1983). This leads to its invasion of river banks, road sides, cultivated lands and forest margins.

Plants generally provide natural conservation, ecological balance and benefits and also contribute towards the aesthetic value of the environment. They are assets in urban and rural landscape. However in certain instances they have negative impact on the ecosystem and other organisms.

*Leucaena leucocephala* has been reported to be suitable as an ornamental and road side land scapping species but caution must be exercised because of its invasive nature. This paper therefore reports on the negative impact of *L. leucocephala* on infrastructures.

### **Materials And Methods**

#### *Study Area*

The area of study is Adeyemi College of Education, Ondo, Nigeria. Ondo is an agrarian community in southwestern geo- political zone of the country. Ondo lies on Latitude 7° N and Longitude 4.75° E.

### **Research Methods**

A combination of social survey and direct field observations after Lipp, (1989) and Kayode, (2002) were used in this study. Photographs of features of interest were taken using Canon Power Shot SX 110 IS Digital camera.

### **Results And Discussion**

*L. leucocephala* was first observed in front of the department of Biology and by the side of the department of Chemistry toward the Integrated science department sometimes in June 1999. It was noticed as a seedling under a waste bin. The process through which the seedling got there was not known. It could probably have been through the activity of dispersal agents such as birds , bats and rodents. However between then and now, it had grown into a matured plant. The population of the species within the campus has increased greatly. They are found scattered in different parts of the campus. Seeds were probably dispersed by rodents, birds and washed down through the drainages to those areas during the rains. This plant is gradually invading the ecosystem of the area under study.

When the invasion started it was not considered a threat and as a result the seedling was over looked and within a short period it grew into a big tree which produced flowers, had large fruit and seed set. The fruit is pod which splits longitudinally, releasing the seeds

by explosive mechanism. The seeds are also dispersed by animals such as birds and rodents. Germination of seeds takes between 5 – 10 days. Seedlings grow at rapid rate and may eventually take over the entire area.

The spread of invasive alien plants is due to their opportunistic exploitation of anthropogenic disturbances; the absence of natural enemies, and frequently their allopathic competitive strategies (Afrin et al., 2010). This is the situation in *L. leucocephala*.

The first concern in this report the invasion of *L. leucocephala* is unchecked. The seeds are

small and brown, (Figure 1) making them to be easily carried by dispersal agents. The brown colour of the seeds make it difficult to be seen by predators. The thin slender tap root system of the seedlings enable seeds to germinate and develop in the smallest openings (Figure 2) As a result of this, *L. leucocephala* are found growing in odd places; cracks, on the rocks, crevices in soak away, building foundations e.t.c. If the present rate of its invasion in not checked, within the next few years *L. leucocephala* would have taken over the entire campus.

Secondly, the presence of *L. leucocephala* in undesired places destroys the aesthetic value of such places. Figure 3a showed the presence of *L. leucocephala* on the foundation of a building. This tree was very close to a verandah, but was unchecked. There is no reason why the tree was not removed earlier since in the locality where the study area is located, this plant do not have any ethno-botanical uses except the provision of shade in some cases where *Ficus* spp. and *Terminalia* spp. are not available. The presence of *L. leucocephala* close to the wall is not required because there is no need of shade. Figure 3b also showed *L. leucocephala* on a foundation. The presence of this plant in unwanted places removes the beauty of that area, makes it unwholesome. The presence of these plants on foundation weakens the foundation.

Figure 4 showed *L. leucocephala* growing at the opening of a drainage system. Presently it is not checked. Its presence is gradually blocking the flow of water and if care is not taking flow of water runoff may eventually be blocked. The penetrating roots have caused cracks on the concrete of the drainage. The presence of *L. leucocephala* at the opening of the drainage is disgusting.

Figures 5a and b showed *L. leucocephala* growing on a beautiful well laid out stony embankment. The stony embankment added colour to that environment. Unfortunately the presence of this invasive plant is gradually over shadowing the beauty. More over the

concrete are weakened by the penetrating down the concrete. Within the next few years the embankment may bow down to physical forces and crumbles.

Figure 6 showed the seedlings of *L. leucocephala* growing a building and this makes the surrounding area unkempt. Despite the paintings on the walls the presence of these seedlings makes the place to be untidy.

Figure 7 showed a matured plant attached to a concrete floor. This has been cut with matchet several times but it keeps rejuvenating. The black woody stump is not appealing to sight. It disfigures the entire area and cause cracks on the wall as the roots penetrate more and more underground.

The position of this paper is that these plants must be checked before they exert deleterious effects on structures. We must create awareness of the destructive tendency of *L. leucocephala* on structures and the need to checkmate their invasion despite some of their functional uses in agro system.

### **Control Measures**

#### *a. Cultural Control.*

##### Hand Pulling

Hand pulling could be effective where infestations are still very young and the invaders are shallow rooted. Digging up the root system before the seedlings are well established.

##### Cuttings

Nearly all *L. leucocephala* will coppice if cut once, but repeated cutting during the growing season would cause depletion of root reserves which eventually result in death. *L. leucocephala* has the ability to grow again despite several matchet cuts and uprooting. This has made elimination difficult. Figure 8a and b showed thickets of regrowth after the plant has been cut. In Figure 8a *L. leucocephala* has been cut more than twice but it keeps rejuvenating.

#### *b. Chemical Control*

The use of herbicides has not been too effective in the control of *L. leucocephala*.

Contact and systemic herbicides have short time effects since *L. leucocephala* will easily rejuvenate.

These options should be incorporated into integrated control program.

Whichever method or combination of methods chosen there are general principles to follow. Firstly, light infestations are easier to deal with than heavy infestation. They can also get worse if ignored. Heavy infestation may not be easy to deal with. It is better to tackle the easiest problem. Secondly, no control operation succeeds for the first time. One or more follow ups are essential. When attempting to clear a large area, it is should done, clearing a portion at a time, gradually increasing the area covered. There is the need to always check back on the areas cleared earlier to ensure that there is no reinfestation.

One major factor that has encouraged the spread of *L. leucocephala* has been the nonchalant attitude of people to its presence in their neighbour hood. When these plants are observed in the environment, on walls, foundations, e.t.c people do not bother to remove them at the juvenile stage. They are left to keep growing until they cause great damages to the structures. There is the need therefore to create awareness of the threat of *L. leucocephala* infestations in our environment. This awareness could be created through public enlightenment campaigns', encouraging individuals to be more observant and look out for *L. leucocephala* infestation and remove them immediately before they get out of hand.

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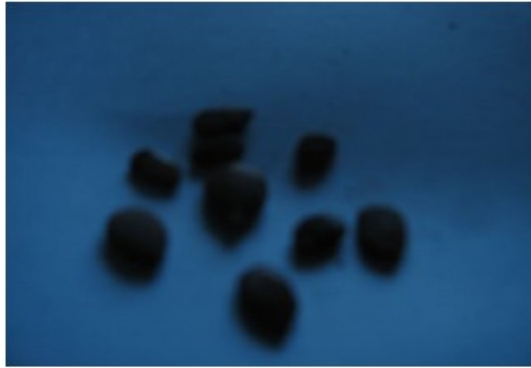


Figure 1: Brown seeds of *L. leucocephala*



Figure 2: Seedling of *L. leucocephala* showing the slender tap root.



(a)



(b)

Figure 3 a and b: *L. leucocephala* having its root into the foundation of a building. Figure 3a is the Stump of *L. leucocephala* deep into the foundation.



Figure 4: *L. leucocephala* blocking one of the drainages





Figure 5 a and b showing *L. leucocephala* growing on a stony pavement.



Figure 6: Seedlings of *L. leucocephala* growing around a building.



Figure7: A matured *L. leucocephala* firmly attached to a concrete floor.



(a)



(b)

*Figure 8: L. leucocephala that had been cut showing dense thickets of regrowth.*