A Review On Cyclone Resistant Plants Found In Cyclone Prone Odisha, India

Atia Arzoo, Srimay Pradhan

Abstract: While the eastern part of coastal belt of India is considered as one of the most cyclone prone areas in the world, Odisha is considered as more vulnerable as compared to the other eastern states of India. Cyclones can be detrimental to the environment. The literature on considerable impacts of cyclones on the human lives, infrastructure and environment has been reported scantily. So this review is based on the major cyclonic storms hitted to Odisha coast and cyclone resistant plants found in Odisha. In this review it was found that the cyclone resistant trees like Azedirachta indica, Millettia pinnata (L.) Panigrahi, Mimusops elengi L., Syzygium cumini (L.) Skeels, Alstonia scholaris (L.) R. Br., Senegalia catechu var. (L.F.) P. J. H. Hurter & Mabb., Terminalia arjuna, Saraca asoca, Terminalia chebula Retz., Terminalia bellirica, Dalbergia sissoo Roxb. ex DC. Magnolia champaca, Ficus racemosa L. can be planted for getting protection from damage. Cyclone resistant plants can be selected on the basis of their deep penetration of root with tap root system and susceptibility to trunk. Strength of the trunk varies between species to species due to differences in the capacity of wind resistance, its flexibility, density of wood, crown symmetry and the presence of damaged hollows caused by termites. During cyclone trees can protect the properties from debris attack and protect the structure safe from damaging structures further downwind. So selection of proper species must be necessary to ensure that tree which is planting either cyclone resistant or not.

Key words: Major cyclonic storms, Cyclone resistant trees, Odisha

1. INTRODUCTION

A cyclone is a large scale rotatory air mass with low pressure in the centre surrounded by high pressure outside. It is a powerful swirling storm. While the eastern part of coastal belt of India is considered as one of the most cyclone prone areas in the world, Odisha is considered as more vulnerable as compared to the other eastern states of India. The location of Bay of Bengal and the virtual absence of any landmass between the largely volatile tectonic regions of Indonesia and Malaysia and that of Odisha and Andhra Pradesh coastline dictates exposure of heavy disturbances on the oceanic floor to the twin states. Low resistance due to flat lands and absence of hill regions to prevent formation of high wind and land fall. Wind direction is also responsible for cyclonic storm in a particular area. The wind of Bay of Bengal is upward and west ward and the absence of any lofty mountains in the eastern coast make it stronger and conducive to carry cyclones at ease. Another factor for cyclonic storm is Oceanic chemistry. Warmer and more sweeter (due to more fresh water flowing to the ocean) contributing to higher amount of vapour formation which is conducive for cyclonic formation. After knowing the cyclone prone area, people also continue to live in that area because that area is having superior economic opportunities, better agricultural facilities due to fertile volcanic and flood plain soils (Alexander, 2017). So there is a need to identify the cyclone resistant plant which can protect itself as well as the properties around which that will plant.

MAJOR CYCLONIC STORM HITS TO ODISHA COAST

There are several major and minor cyclonic storms were found to be affected Odisha coast, Among which some major cyclonic storms like:

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1. Super cyclone, 1999: The super cyclone was landfall on 25th October, 1999 with highest wind 260 km/h and low pressure 26.93 Hg. The cyclonic storm was most severe to strike Odisha, raking the state and adjacent areas with high storm surge, powerful winds and torrential rainfall. The total damage cost of destruction by super cyclone amounted to US$4.44 billion.

2. Phailin, 2013: It was landfall on 4th October, 2013 with highest wind 215 km/h and low pressure 27.76 Hg. Properties of around US$4.26 billion were damaged and 45 peoples were died in India.

3. Hudhud, 2014: It was land fall on 7th October, 2014 with highest wind 215 km/h and low pressure 28.05 Hg. The total damage cost of destruction by super cyclone amounted to US$3.58 billion and total fatality was 124.

4. Titli, 2018: This cyclone makes landfall at Gopalpur, Odisha on 11th October, 2018. It was uprooted trees and electric poles and damaged hutments in Ganjam and Gajapati districts of Odisha but no loss of lives was reported. (The Economic Times, 11th October, 2018).

5. Fani, 2019: It was land fall on 26th April, 2019 with highest wind 250 km/h and low pressure 27.52 Hg. The total damage cost of destruction by super cyclone amounted to US$8.1 billion and total fatality was 89.

CHARACTERISTICS OF A CYCLONE RESISTANT TREE

No trees will always stand up to cyclonic strength winds as there are many factors which influence their ability.

i. Flexibility: Trunk flexibility is measured by elastic modules of trees. The trees are having lower elastic module bend more easily when exposed to lateral wind loading and allowing the trees to shed the wind and remain upright (Anser and Goldsten, 1997). Good flexibility is found in some palms with their flexible stem.

ii. Root system: Well developed root system is preferably one with a good tap root and when the roots have not been cut on one side by road works or some other works.

iii. Ease of defoliation: It is the ability to loss leaves quickly which offer little resistivity to the wind. Many eucalyptus lost leaves quickly.

iv. Susceptibility and strength of trunk: Strength of the trunk varies between species to species due to differences in
resistant to wind, flexibility of trunk, density of wood, crown symmetry and the presence of damaged hollow spaces caused by termites. Trunk failure is a major factor of tree damage when the soil is comparatively dry prior to the cyclonic impacts (Jakes, 2011). Trunk failure is mostly dependent on a range of factors.


vi. Density of wood: It is measured as the mass per unit volume. Density of wood is related to the capability of wood to resist a wind force known as torsional forces (Anser and Goldsten, 1997).

vii. Crown symmetry: The likelihood of the tree being subjected to force applied in twisting an elongated object known as torsional forces (Skatter and Kucera, 2000).

viii. Hollows in trunk: It is also another major factor responsible for failure of trunk (Stocker, 1976).

The capability of the windbreak is also another factor that greatly depends on its orientation which is relative to dominant winds direction (Visser and Cleijne, 1994). Trees give shelter to all living beings and it also protect itself from damaging winds, forming its structures by which it can resist wind speed (Vander Sommen, 2002). Trees also provide greatest benefits like its ability to capture the flying debris (Cameron et al., 1981). Trees can also be considered as a significant source of flying debris themselves, the efficiency of the trees to capture the flying debris is highly dependent on its structure and also strength (Mason and Haynes, 2009).

Environmental degradation can be caused due t different natural disasters among which cyclone is one of them. For avoiding the major impacts of cyclones on the human lives, infrastructure and environment. In addition to that, it also affects on coral reefs due to coastal erosion and the destroying cyclonic winds strip foliage, uproot trees and flatten crops, while the salt spray blown off the ocean is driven inland where it burns and poisons coastal vegetation (Terry, 2007). There is a little published research is available, and even less of this literature relates to the cyclone resistant trees found in Odisha. Selection of cyclone resistant trees must be needed for plantation at cyclone prone area.

### A list of some cyclone resistant trees

<table>
<thead>
<tr>
<th>Sl. No</th>
<th>Botanical name</th>
<th>Common name</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Azadirachta indica</td>
<td>Neem (E), Nimba (O)</td>
</tr>
<tr>
<td>2</td>
<td>Miletta pinnata (L) Panigrahi</td>
<td>Indian beech(E), Karanja (O)</td>
</tr>
<tr>
<td>3</td>
<td>Mimusops elengi L.</td>
<td>Spanish cherry(E), Baula (O)</td>
</tr>
<tr>
<td>4</td>
<td>Syzygium cumini (L) Skeels</td>
<td>Black berry(E), Jamu (O)</td>
</tr>
<tr>
<td>5</td>
<td>Alistonia scholaris (L) R. Br.</td>
<td>Devil’s tree(E), Chatian (O)</td>
</tr>
<tr>
<td>6</td>
<td>Senegalia catechu var. (L.F.) P. J. H. Hurter &amp; Mabb.</td>
<td>Cutch tree(E), Khaira (O)</td>
</tr>
<tr>
<td>7</td>
<td>Terminalia arjuna</td>
<td>Arjuna tree(E), Arjuna(O)</td>
</tr>
<tr>
<td>8</td>
<td>Saraca asoca</td>
<td>Ashoka (E &amp; O)</td>
</tr>
<tr>
<td>9</td>
<td>Terminalia chebula Retz.</td>
<td>Indian walnut(E), Harida (O)</td>
</tr>
<tr>
<td>10</td>
<td>Terminalia bellirica</td>
<td>Beach almond(E), Bahada (O)</td>
</tr>
<tr>
<td>11</td>
<td>Dalbergia sisoo Roxb. ex DC.</td>
<td>Indian Rosewood(E), Sisoo(O)</td>
</tr>
<tr>
<td>12</td>
<td>Magnolia champaca</td>
<td>Pagoda tree(E), Khata Champa(O)</td>
</tr>
<tr>
<td>13</td>
<td>Ficus racemos L.</td>
<td>Fig tree(E), Dimiri (O)</td>
</tr>
</tbody>
</table>

### CONCLUSION

During cyclone, cyclone resistant trees pay the significant role as it controls the speed of wind, it can also captures the windborne debris which plays a major role in destruction of property as well as lives. Plantation of cyclone resistant trees from around properties can protect them from debris attack. Although fallen trees can also capture fallen debris, careful species selection may be necessary to ensure that vegetation captures rather than contributes to flying debris. So careful species selection may be necessary to ensure that tree which is planting either cyclone resistant or not.

### ACKNOWLEDGEMENT

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### REFERENCES

4. [Cyclone Titli makes landfall at Odisha's Gopalpur, The Economic Times, 11th October, 2018.](#)

