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Urbanization Threat on Mysore-Betel Leaf Extinction in Mysuru City of Karnataka State, India Using Geospatial Technology

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Abstract

Mysore-betel leaf is a variety of heart shaped betel (Piper betel) leaf grown in and around Mysuru region. These are said to differ from other betel leaves due to their smooth texture, hot taste & flavor and traditionally offered as a mark of respect and auspicious beginnings. Mysore-betel leaf (Chigurele or Veelyedele) has been traditionally used as ink, stimulant, laxative and contraceptive and has held pride of place in cultivation within villages and palace gardens since the time of the Wodeyar Maharajas of Mysore. The air in the district was once thick with the aroma of Mysuru Mallige (Jasmine), but unplanned and rapid urbanization has seen the cultivation of the flower decline perceptibly. Now after Mallige, the famed Mysore-betel leaf farms are disappearing due to urbanization threat that could become casualty of near unfettered modernization. There are hardly any Mysuru-betel leaf growers in the city limits. Betel leaf farms in the city ran into hundreds of acres-stretching from Shankara Mutt to Koppaluru in JP nagar; from KG Kopplu to Ashokapuram- but now most of them have either been transformed into large residential layouts, or hospitals and colleges.

Keywords: *Urbanization threat, Mysore-betel leaf, Mysuru, Geospatial technology*

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INTRODUCTION

The scientific name of betel leaf is Piper betel, belonging to the family Piperaceae (Sandeep Kumar, 2012). Mysore betel (Chigurele) was preferred most as they have an unparalleled taste. About 600 million people worldwide consume neatly wrapped betel quid's in their varying forms (Fig.2). Betel leaves has its dominant place in Indian commercial market due to its high medicinal values as per the history of Ayurvedic system, also habit of people chewing betel leaves with areca nut as a good and cheap source of dietary calcium (Shailendra Kumar and Jaya Sinha, 2018; Preethy et al, 2016). These leaves are well known as Veelyedele in Karnataka and Paan in other places of India (Sandeep Kumar, 2012). It is widely cultivated in Andhra Pradesh, Assam, Bihar, Tamil Nadu, Madhya Pradesh, West Bengal, Orissa, Maharashtra, Pradesh and Karnataka (Sandeep Kumar, 2012). Major betel leaf growing countries are India, Bangladesh, Srilanka, China, Indonesia, Nepal, South Africa, Burma, Malaysia, Thailand, Philippines etc, mainly used as stimulant (Uttar Khoshoo, 1981; Singh, 1994; Samanta, 1994; Jana, 1996; Suryanarayana et al, 2014). Offering betel morsel (pan-supari) to guests as a mark of respect and auspicious beginnings is a traditional in Indian culture. Betel leaves has many medicinal properties such as arresting secretion or bleeding, aphrodisiac, treating sore throat, treatment of nervous pains, nervous exhaustion, debility and many more (Guha, 2006; Sandeep Kumar, 2012). Betel leaves were cultivated only in about 900 acres in & around the Mysuru district, back yard of Mysore Palace, and surrounding areas of Mysore city. These betel leaf landscapes are fast disappearing being reduced to relics of a not too distant past (MDEP, 2020).

Annual production of betel leaves in India worth Rs.9000 million and about 20 million workers earn their income by production, processing, handling, transportation and marketing (Suryanarayana, 2014; Guha, 2006). India is a member of WTO (World Trade Organization) and exported 6,159.39 MT of betel leaves to the world for the worth of Rs. 26.18 crores in 2020-21. Betel leaf farming was declined during March 2011 and trading has dropped by 65% from 2000 to 2010, and created an oversupply. At present, it is facing a threat due to urbanization, highly erratic from year to year, lack of soil moisture, insufficient water supply (Aloke Bar et al, 2020), poor rainfall conditions (Fig.1a), temperature and spoilage rate of 35% to 70% during

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transport over poor infrastructure (Fig.1b) (Guha, 2006). The harvested leaves are consumed locally and exported to other parts of Asia, the Middle East, Europe, and the America. But the Indian farmers do not find betel farming lucrative anymore due to various factors and the demand is also dropping simultaneously in India (Fig.1c).



Fig.1 (a) Betel leaf decline due to poor rainfall conditions; (b) Spoilage during transportation; (c) Declined interest among farmers due to dropping demand



Fig.2 Betel leaf Paan (quid) in varying forms

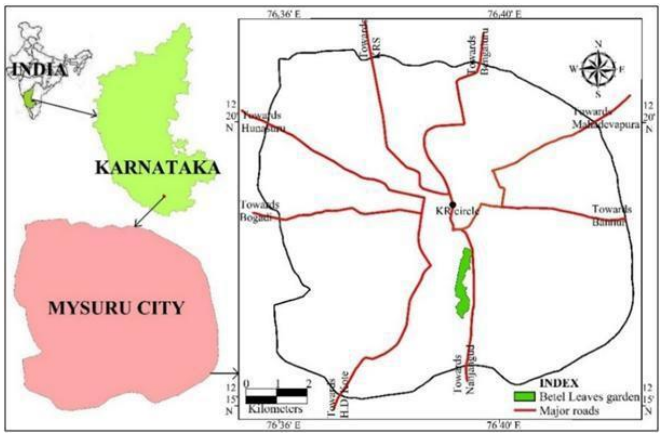


Fig.3. Location of Betel leaf garden in the study area (Toposheet-1978)

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METHODOLOGY

A. Study area

About 50 years ago, the Mysore betel leaves were grown in the gardens of the Mysore Maharaja Palace and were later spread to 100 acres from Poorniah Choultry in Old Agrahara to Vidyaranya puram junction, which connects the Mysore-Nanjangud Road in Mysore. Gradually, it was spread to about 500 acres around Mysore. Gomate farm, anekarati farm, koduge farm, basavanagudi farm, hosa farm were among some of the more prominent betel leaf farms in the Mysuru district. Unique condition of hot, humid climate and black clay in the soil in this stretch is thought to have given the leaves a unique hot taste and smooth texture that earned it the name 'Mysore betel leaf (Chigurele). Betel is a tropical plant, so it needs a warm and high atmospheric humidity to grow properly.

It thrives best under shade and in a temperature ranging from 180 to 400C and suitable for cultivation in both uplands and wetlands of rainfall conditions ranging between 1250-4750mm (Suryanarayana, 2014). Well-drained fertile sandy or sandy loam or sandy clay soil with pH range of 5.6 to 8.2 is considered suitable for its cultivation (CSIR, 1969; Guha and Jain, 1997).

B. Methods & Materials

Survey of India (SoI) toposheet (57D/11) of 1:50,000 scale are digitized and extracted the precise boundary of Betel leaf garden in Mysuru city during 1978 and 2011 (Fig.3). Google earth software is adopted as a tool for analyzing and mapping the patches of Betel leaf garden during 2021 within the study area. Field photographs are collected using a handheld GPS (eTrex-10) of 3m accuracy to check the conditions and change detection due to urban impacts.

RESULTS AND ANALYSIS

A. History & Cultivation

The betel leaf is native to the Indian subcontinent, has been used for 5000 years. Historians said that the King Mummadi Krishnaraja Wodeyar offered these leaves to his guests at the Mysuru palace. It spread at a very early date throughout tropical Asia and later to Madagascar and East Africa (Sandeep Kumar, 2012). Betel plant resembles heart form, shiny, smooth pointed apex with long-stalked leaves that grow on moist soil(Rupa Sengupta and Jayanta Banik, 2013; Moumita Nath and Pradip Debnath, 2021). The betel plant is a slender, aromatic creeper, rooting at the nodes and the branches are swollen at the nodes (Sujay Rai et al, 2005). It creeps on along

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pole or a compatible tree with proper shade and irrigation. The cuttings are planted at the beginning of the monsoon season on well-drained fertile soil. Dried leaves and wood ash are applied to the furrows at fortnightly intervals and cow dung slurry is sprinkled. In 3 to 6 months, it reach 150 to 180 cms in height and branching starts. Harvest begins, with the farmer plucking the leaf and its petiole with his right thumb. The harvest of these leaves lasts 15 days to within a month



Fig.4. Betel leaf cultivation in Betel Leaf Garden of Mysuru city

B. Geographical Indication (GI)

India has acknowledged with 617 products of Geographical Indication (GI) tags. Karnataka has received Geographical Indications (GI) tag for 42 products and of that 18 are from Mysuru including Mysore-Betel Leaf, Mysore Jasmine, Mysore Paintings, Mysore Sandal Soap, etc. However, many of these products are under extinction due to several urbanization impacts.

The Department for Horticulture under the government of Karnataka proposed the registration of the Mysore betel leaf to the Office of the Controller-General of Patents, Designs and Trademarks, Chennai, under the Geographical Indications of Goods Act (1999) (Anonymous, 2011). Mysore-betel leaf of Karnataka bagged a geographical indicator of India on 30/01/2006 due to its unique flavor of sweet & burning hot and a divine aroma.

Table.1. List of Few Registered Geographical Indicators of Mysuru

Sl No.	Geographical Indication	Type
1.	Mysore Silk	Handicraft
2.	Mysore Agarbathi	Handicraft
3.	Mysore Rosewood Inlay	Handicraft
4.	Mysore Sandalwood Oil	Manufactured
5.	Mysore Sandal Soap	Manufactured
6.	Mysore Traditional Paintings	Handicraft
7.	Mysore-Betel Leaf	Agricultural
8.	Mysore Mallige	Agricultural
9.	Mysore-Pak	Sweet

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C. Health Benefits

A betel leaf contains vitamin C, iron, carotene, fiber, potassium, iodine and thiamine and hence is used widely in Ayurvedic medicines to prevent bad teeth, treat ulcers and acne, helps to relieve cough and cure bronchitis disorders (Suryanarayana et al, 2014).Betel leaves show quick improve in health benefits such as, ensures better health of digestive system (Prabhu et al, 1995); bloating & intestinal gas; better oral hygiene; control the acid level & kill germs in mouth that caused bad breadth; controls cough & cold; provide relief & healing to pharyngitis & tonsillitis problem; cure throat infection; control diabetes; healing wounds; treating acne and others (Manoj Rai et al, 2011).Betel leaf oil has rich antibacterial properties that keep scalp healthy promoting unhindered hair growth and well nourished(Anonymous, 2001) (Fig.5). Leaves are used as blood purifier, carminative, stimulant, relief to cough when mixed with black pepper, a pinch of salt and chewed makes a good relief from cough. A beverage called Pan - Supari has been developed by Central Food Technological Research Institute (CFTRI), Mysore and is said to be good source of Calcium. The leaves contain good amount of vitamin B, ascorbic acid and carotene.



Fig.5. Ayurveda and Health benefits of Betel leaves

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D. Threat of Urbanization

Areas that used to cultivate the betel leaf have shrunk considerably due to expansion of real estate and only 2% of the total betel leaves that arrive in city market. Poor betel leaf farmers were under pressure from those in the real estate sector to part with their land for throwaway prices (Fig.7c). Mysore Mallige (jasmine), Mysore silk, Mysore Agarbathies (incense sticks), Mysore betel leaves (Chigurele), and Mysore sandalwood and oil are being pushed and are gradually disappearing from the market. Cultivators of these leaves have either lost their land due to the impact urbanization (Fig.8c) or shifted to other commercial crops.

Despite the onslaught of urbanization and other impacts, a few farmers have continued to cultivate betel vines in a small area in Mysore. Their lands are threatened of acquisition, as their lands form a prominent part of the enlarging city (Fig.8c). The betel vine growers were dwelling in precarious condition and many were often forced to change to other profession for their livelihood (Fig.1a&c). Another striking constrain is that about more than 60% of betel vine growers does not have their own lands.

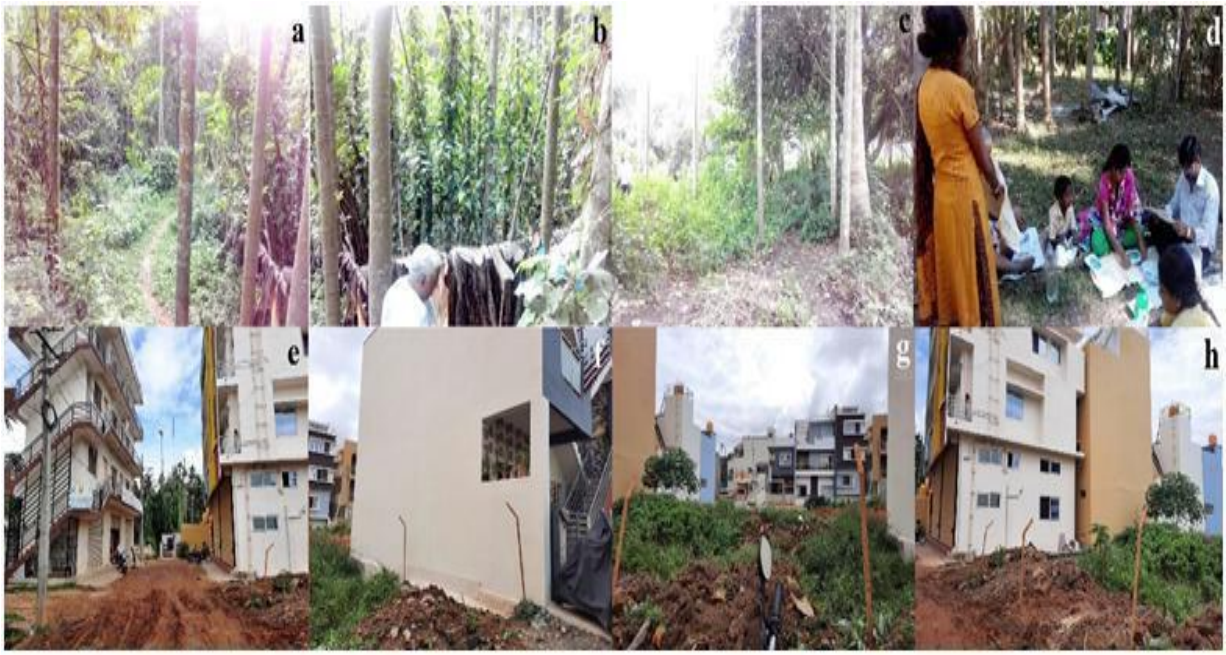


Fig.6. (a,b,c,d) Before and (e,f,g,h) After impacts of Urbanization over Betel leaf garden in Mysuru city

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However, rapid urbanization, scarcity of labor, plastic pollution, lack of water sources, depletion of groundwater table, disinterestedness of the younger generation to continue the profession of their ancestors are forcing the growers to stop its cultivation. The earlier 700 acres of land in Mysuru has been reduced to a few acres now. Hundreds of marginal growers, majority of them SC families from Ashokapuram, who have been cultivating this crop from the last four generations, are now moving away from this. Earlier the betel leaf cultivation was observed from Shankara Mutt to Koppaluru in J.P. Nagar, from K.G. Koppal to Ashokapuram (Fig.6a,b,c,d), have now been transformed into large residential layouts, hospitals and colleges (Fig.6e,f,g,h). Growers were facing a threat from real estate sector as they are being forced to sell their land due to close proximity to main roads and city headquarters (Fig.7a,b,). This is a labor-intensive crop and these days, labor is hardly available. Younger generation are reluctant to continue this profession due to competition and lack of government support and low income.

Earlier, growers used to draw water from the storm water drain that originates from Doddakere Maidana and pass through their farms, but now this drain has become a sewage drain. Flooding caused by this clogged drain brings huge amount of plastic during rainy season and results in water logging and turns our farms into plastic waste yard. Few years ago, the farmers were getting water by digging a few meters deep, but now it's difficult to maintain their farms during extreme summer conditions as water sources are either blocked, dried up or diverted into drainages. Many helpless growers have made up their mind to sell their land as it is fetching a good price due to rise in real estate market.

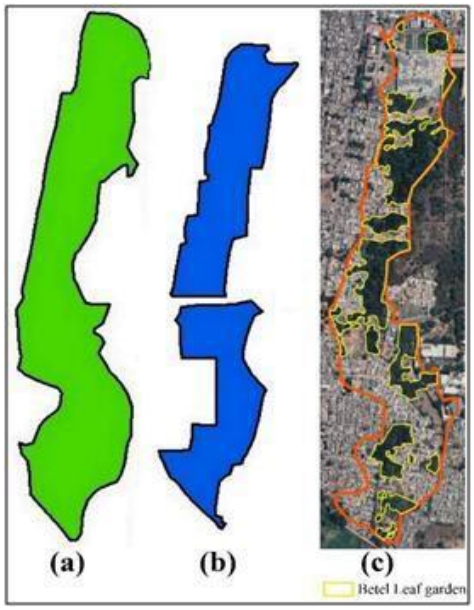


Fig.7. Betel leaves garden in (a) Toposheet-1978 (b) Toposheet-2011 (c) Google Earth-2021

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Table.2 Temporal mapping of Mysore-Betel Leaf growing land (Acres) in the study area

Sl. No	Toposheet-1978	Toposheet-2010	Google Earth-2021
	Area in acres	Area in acres	Area in acres
1.	158.66	130.76	74.9

DISCUSSION

No other city in the country which lends its name, Mysore' as a prefix to a number of consumable items that become much sought after, making them nationally and internationally famous. Mysore Mallige (jasmine), Mysore silk, Mysore Agarbathies (incense sticks), Mysore betel leaves and Mysore sandal wood and oil stand out among them. A majority of customers including local beeda and paan shop owners prefer Mysore Veelyedele for consumption, wedding, pujas and religious rituals. Sadly, the demand is high and supply has almost stopped due to urbanization. Only a few growers from J.P. Nagar and Koduge farm are supplying this variety once or twice a week. While most of the Mysore Veelyedele is sent outside Karnataka, only 2% of Mysore betel leaves arrive at the City Market. Udburu, Chikkakaturu, Nanjanagudu, Hunasuru, Heggada Devana Kote and Krishna Raja Nagara also supply betel leaves to ease the supply shortage.Betel leaves from these regions also matches the taste of Mysore betel leaves to some extent. But several factors have impacted these consumables and are being pushed to oblivion that are gradually disappearing from the market. The growers are under severe pressure, threatened of acquisition, as their lands from a prominent part of the enlarging city.

CONCLUSION

Rapid urbanization and conversion of betel-leaf farms into new layouts have shrunken the area of betel-leaf cultivation in the city. Increased labor cost, fluctuating prices, and sensitive nature of this crop have made betel-leaf farming less attractive. Brand crops from Mysuru like Mysore betel leaves and Mysore Mallige (Jasmine) have brought a special fame to the city. However, unfettered modernization and expansion of real estate in leaps and bounds have literally threatened the existence of these crops. If Mysore Jasmine became the first victim of ungirdled development with the areas of cultivation significantly reducing over the years, Mysore Veelyedele is the second brand crop to fall prey to urbanization. Both Mysore Jasmine and Mysore Veelyedele that enjoy Geogrpahical

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Indication (GI) Tag will soon go down in the history, if the proper protection and support is not provided timely.

CONFLICTS OF INTEREST

The authors declare no conflicts of interest.

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REFERENCES

1. Aloke Bar, Anupam Pariari, Pooja Biswas, Milan Karmakar and Gobinda Saha (2020). Comparative Studies on Leaf Yield, Quality and Economy of Three Cultivars of Betelvine (Piper betle L) as influenced by Integrated Nitrogen Management, International Journal of Current Microbiology and Applied Sciences, Vol.9, No.11, Pp: 3137-3147.
2. Anonymous (2001). The Wealth of India, Vol.3, CSIR, New Delhi.
3. Anonymous (2011). Horticultural statistics of Karnataka State, Department of Horticulture.
4. Chayanika Sarma, Prasad Rasane, Sawinder Kaur, Jyoti Singh, Joginder Singh, Yogesh Gat, Umar Garba, Damanpreet Kaur and Kajal Dhawan (2018). Antioxidant and Antimicrobial potential of selected varieties of Piper betle L. (Betel Leaf), Annals of the Brazalian Academy of Sciences, Vol.90, No.4, Pp: 3871-3878.
5. CSIR (1969). Council of Scientific and Industrial Research, The Wealth of India, New Delhi, Vol.8, Pp: 84-94.
6. Geographical Indication of goods (Registration and Protection) Act, 1999. Geographical Indication Registry, Govt. of India, 2006, https://search.ipindia.gov.in/GIRPublic/Application/ViewDocument
7. Guha P (1997). Exploring Betel leaves for Cottage industry, In: Krishi, Khadya-O-Gramin Bikash Mela-A booklet published by the Agricultural and Food Engineering Department, IIT, Kharagpur, India, Pp: 15-19.
8. Guha P (2006). Betel Leaf: The Neglected Green Gold of India,

Page 1-12 © MANTECH PUBLICATIONS 2022. All Rights Reserved

Journal of Human Ecology, Vol.19, Issue.2, Pp: 87-93.

9. Jana B.L (1996). Improved technology for betel leaf cultivation, Seminar cum workshop on Betel leaf marketing, State Cashew nut farm, Directorate of Agricultural Marketing, Digha, Midnapur, West Bengal, India.
10. Khoshoo T.N (1981). Welcome address. In: Proc. Of Group Discussion on improvement of betel vine cultivation. S.D. Khanduja and V.R Balasubramanyan (Eds.). National Botanical Research Institute, Lucknow, India, Pp: 17-20.
11. Manoj P Rai, Karadka Ramdas Thilakchand, Princy L Palatty, Prathima Rao, Suresh Rao, Harshith P Bhat and Manjeshwar Shrinath Baliga, (2011). Piper Betel Linn (Betel Vine), the Maligned Southeast Asian Medicinal Plant Possesses Cancer Preventive Effects: Time to Reconsider the Wronged Opinion, Asian Pacific Journal of Cancer Prevention, Vol.12, Pp: 2149-2156.
12. MDEP (2020). Mysuru District Export Promotion, Action Plan, Draft Copy of Office of the Additional Director General of Foreign Trade, Bengaluru, Pp: 1-17.
13. Moumita Nath and Pradip Debnath (2021). Chemistry behind the Betel Leaves and Betel Quid: Their Health Benefits and Adverse Health Effect- A Review, Insights in chemistry and Biochemistry, Vol.1, Issue.5, Pp: 1-9. DOI: 10.33552/ICBC.2021.01.000521
14. Prabhu M.S, Patel K, Saraswathi G, Srinivasan K (1995). Effect of orally administered betel leaf (Piper betle Linn) on digestive enzymes of pancreas and intestinal mucosa and on bile production in rats, Indian J. Exp. Biol., Vol.33, Pp: 752-756.
15. Preethy T.T, Aswathi K.K, Renisha Jayarajan Mannambeth and Asha V.Pillai (2016). Spectrum of variation in land races and different morphological characters of Betel vine, International Journal of Current Research, Vol.8, No.03, Pp: 28164-28170.
16. Rupa Sengupta and Jayanta K.Banik (2013). A Review on Betel Leaf (PAN), International Journal of Pharmaceutical Sciences and Research, Vol.4, Issue.12, Pp: 4519-4524.

Page 1-12 © MANTECH PUBLICATIONS 2022. All Rights Reserved

17. Samanta C (1994). A report on the problems and solutions of betel vine cultivation. A booklet published by Mr. II.R. Adhikari, C-2/16, Karunamoyee, Salt Lake city, Kolkata, -64(WB), India.
18. Sandeep Kumar E (2012). A Novel Neural Network based approach for the classification of Betel leaves, International Journal of Emerging Trends & Technology in Computer Science, Vol.1, Issue.2, Pp: 10-16.
19. Shailendra Kumar Maurya and Jaya Sinha (2018). Development and Sensory Evaluation of Tea Biscuit using unique Properties of Betel Leaf Oil, International Journal of Current Microbiology and Applied Sciences, Vol.7, No.6, Pp: 210-227.
20. Singh P (1994). Betel vine, J.K publishers, West Bengal, Pp: 1-120.
21. Singh and Khan (1990).
22. Sujay Rai, Mainak Mal, Atul Wahile and Pulok K Mukherjee (2005). Review-Therapeutic potentials and untoward effects of Piper betle and its quid, Oriental Pharmacy and Experimental Medicine, Vol.5, No.4, Pp: 272-282.
23. Suryanarayana M.A, Vasantha Kumar Thuppil, Hima Bindu Kaipa and Lokesha A.N (2014). Status of Betel vine Cultivation in Karnataka, Conference: National meet on Betel vine-Farmers, Traders and Researchers Interface, IIHR, Bengaluru, Pp: 1-5. https://www.researchgate.net/publication/260297526_Status_of_Betel vine_Cultivation_in_Karnataka

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