



Concept Note: Lantana Briquetting

Background

Lantana camara L. (referred to as Lantana from here on), a shrub native to South America, has become one of the worst weeds in recorded history. It was first introduced in India in 1807 (Thakur et al., 1992). Lantana has now spread to become a pan-global weed, reported as invasive in more than 60 countries (Parsons and Cuthbertson, 2001; Day et al., 2003), and identified as one of the top ten invasive species in the world (GISIN, 2011).

Various methods of controlling Lantana have been tried across the country, including fire, mechanical removal, chemical and biological control; and reports suggest that these methods or their combinations were successful in some regions (e.g. Coode, 1930). However, reports from the later part of the 20th century suggest that Lantana continued to spread despite management (Muniappan and Viraktamath, 1986). It has been actively 'managed' for almost a century now (Troupe 1921), yet there appears to be no sign of its spread being contained in Indian forests despite this long history of attempted eradication.

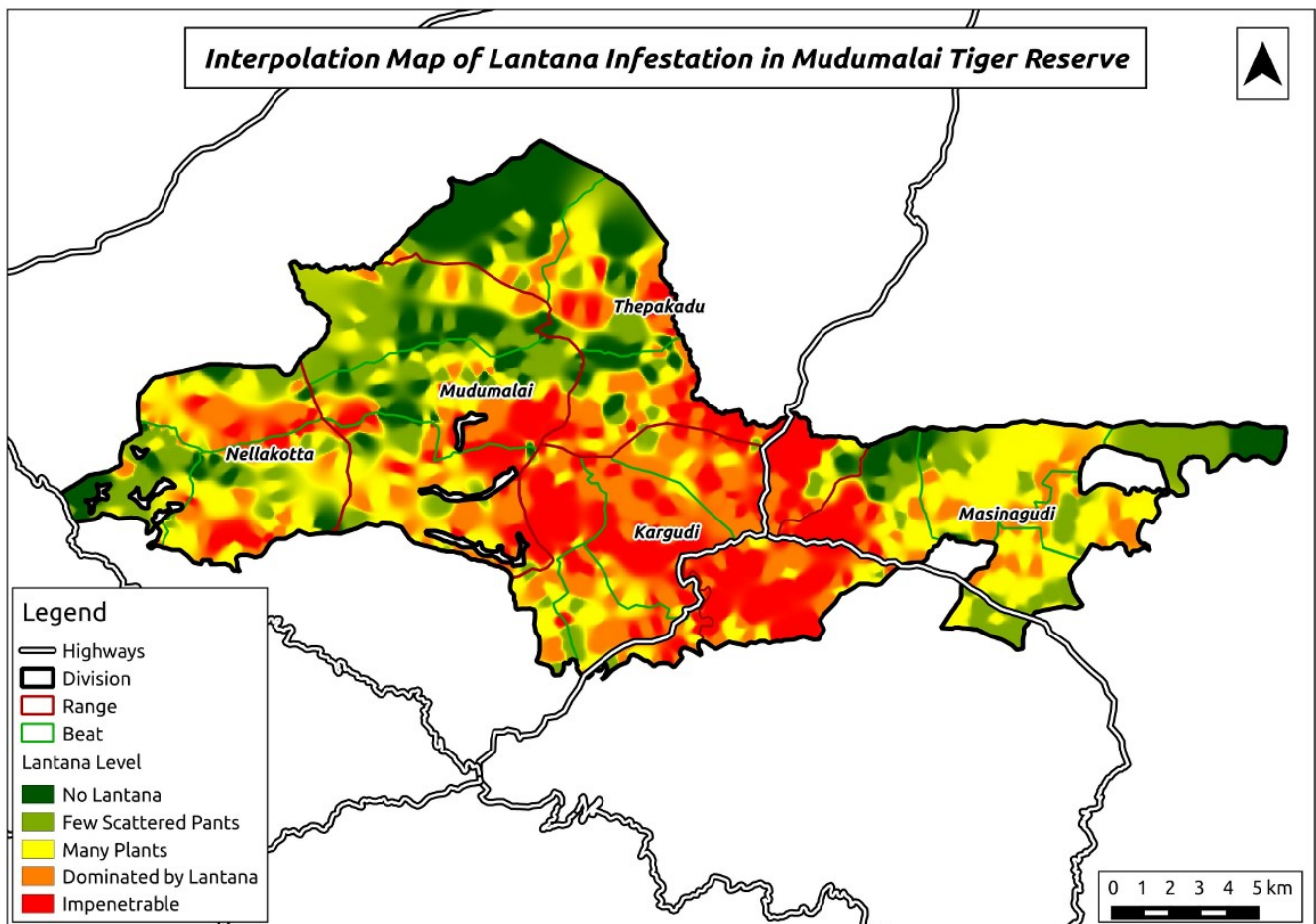
The management of Lantana in Mudumalai Tiger Reserve (MTR) dates as far back as the 1920s, (Ranganathan, 1941) but the weed is still present all through the Reserve (Dogra, 2007). The objective in more recent management plans however, has shifted from that of 'eradication' more towards 'containment' of the Lantana invasion, not allowing it to take over more of the protected area. It has been noted that Lantana is also useful to animals in some cases (Dogra, 2007). Particular efforts were also made by the forest department to mechanically remove Lantana in the grasslands and swamps which are of importance to herbivores (Srivastava, Pers. Comm.).

On the whole the scenario with Lantana is quite serious, with about 14,000 hectares, or 44% of the Mudumalai Tiger Reserve being either 'dominated by Lantana' or 'Impenetrable', and only about 4000 hectares, or 12% of the reserve being completely Lantana-free (based on our field research). The current 'eradication' effort is based on uprooting Lantana in areas that are heavily infested with Lantana, at a rough cost of about Rs. 40,000 per hectare. This is perhaps a futile effort, as removing Lantana from all the heavily infested areas in Mudumalai will cost about Rs. 56 crores. Further, after removing, if there is no follow up weeding effort, the area will get even more intensely dominated by Lantana than before. Examples of this are visible in areas near 'Game Hut' and also along the highway between Thorapalli and Abhayaranyam. Other than in some specific areas that have some special interest – possibly in the tourism zone, around water bodies etc. – we don't think it is a wise allocation of funds to continue with the Lantana clearing.

Local organizations have also worked with tribal communities in the region to help them make

furniture out of Lantana. The idea being that an economic driver which made it viable for tribal communities to extract Lantana on their own would be more effective in controlling the spread of Lantana (The Shola Trust, 2012). But the scale of extraction in furniture is very small given the magnitude of lantana infestation. Use of Lantana for making briquettes would significantly help in ‘control’ efforts, subsidize cost of extraction for the department while simultaneously aid in the livelihood of tribal communities living around the tiger reserve. It also helps in substituting firewood use with cleaner sources of energy.

The map below shows the extent of Lantana infestation in the Mudumalai tiger reserve.



Briquetting; Invasive weed to sustainable energy and livelihoods

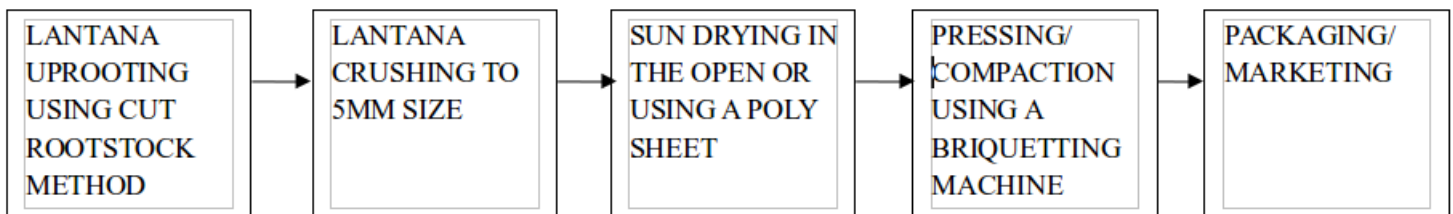


Briquetting is a way of converting loose biomass residues such as saw dust, coffee husk, and forestry waste like *lantana camara* into high density solid blocks that can be used as fuels. Biomass briquettes are an environment friendly, efficient solution to recycling agriculture and forest waste while simultaneously creating clean fuel for burning purposes. These days a number of industries are using bio-mass briquettes for generating heat in their boilers. These compact and easy to use bio-mass briquettes can also be used at the household level for cooking fuel as an alternative for firewood.

Concept Summary

The Eco development committees in the tribal villages will be trained to take up the entire process of briquette production and have complete ownership over the project right from the beginning stages. The EDC members will be trained on the lantana cut rootstock method of extraction. A specially designed lantana up rooter will be used so that it does not disturb the soil. The cut lantana clumps will be immediately chopped up into smaller pieces (of 5mm size and less) with the help of a mobile pulverizing machine mounted on tractor. This tractor mounted pulverizing machine can be taken to the exact location where lantana is being cut. The pulverized lantana will be transported and then be sun dried in the open near the briquetting unit. Biomass to be briquetted must have optimum size (up to 5mm) and appropriate moisture levels (10%). The pulverized lantana would then be passed through a pressing/compacting machine. The pressing machine is used to apply pressure on the powdered bio-mass to compact it into briquettes. The pressure when applied releases lignin from within the bio-mass which binds the material together. The resulting lantana briquettes would be packaged and sold to tea factories/resorts/small hotels and restaurants/households for cooking as an alternative to firewood. This EDC run briquetting unit has the potential to provide a secure source of livelihood and generate employment for 6-7 tribal members while simultaneously aiding in the conservation activities in the tiger reserve.

The briquetting process involves:



1. Lantana uprooting

Removal of lantana clumps using cut-rootstock method - a simple and cost-effective manual method for the removal of Lantana. As the name suggests, it involves cutting the main tap root of Lantana plant beneath the 'coppicing zone' (transition zone between stem base and rootstock). This prevents the plant from coppicing, and at the same time the soil around the plant is not unduly disturbed (as compared to digging up the roots), not encouraging too many of the seeds to germinate.

2. Pulverising the Lantana

Pulverizing is the first step in the briquetting process where the loose biomass is crushed to suitable size of 5mm or less. A pulverizer is fitted behind a tractor which can be moved to different locations. This mobile pulverizer is used to chop up lantana to smaller pieces of 5mm size. The machine is powered by the motor (50Hp and above) of the tractor and is connected to the tractor using the power take off (PTO).



Pulverised Lantana along with the Pulveriser machine.

3. Drying

The crushed/powdered lantana is brought to the briquetting unit. Drying is a very important step in the briquetting process. High moisture levels reduce the calorific value drastically. The pulverized lantana has to be dried to reduce moisture content to around 10%. For this purpose pulverized lantana can be heaped up in the open for drying or even a poly sheet (as shown in the figure) can be used to provide higher temperatures. During rainy season the operations become a little complicated as moisture control is a very critical component of briquetting process. It is preferable to have the unit located in a dry region. The drying process could take a week to ten days subject to the climatic conditions. Therefore it is preferable to locate it in dry regions which receive good sunlight. Given the dry climatic conditions in Moyar it is preferable to locate the unit there as the region also receives abundant sunlight.

4. Pressing/compaction



To produce briquettes with high density the raw material needs to be less than 5mm and dried (<15%). The powdered/pulverized material is continuously fed to the pressing machine. The machine is run by a 60 HP motor and has two flywheels to propel the piston and ram the incoming material against the die and it leaves the die in the rhythm of piston action. Through pressure and friction inside the pressing machine the fed material is strongly heated and the lignin from within the biomass is released to strongly bond the material together. This process is also called binder-less technology as it requires no external binders to bind the material together. The capacity of piston presses depend both on the diameter of the die and pre-treatment of the raw material (size and moisture). Electricity requirement for a pressing machine would be in the range of 50 units per ton of material processed. A screw conveyor is used to gravity-feed the powdered material from the top of the pressing machine as shown in the figure.

5. Marketing of briquettes

Briquettes can be used as an alternative to firewood. The EDC unit could look at small hotels/institutions for sale of briquettes. But given the cheap availability of firewood it would be difficult to sell to this segment. The eco-friendly resorts could use briquettes for running their boilers. But this segment has requirement for very small quantities. For larger volumes the micro-enterprise should cater to the requirements of tea industries. 25% of the total cost of tea is on thermal energy which is currently obtained from firewood. For making one kg of tea approximately 1.5 kg of firewood is required and typically in a day 7-10 tons of firewood per factory is required based on production schedules. There was a UNDP funded project (2008-12) in the nilgiris to reduce energy consumption in tea factories and one of the major thrust areas was the use of briquettes. So Tea factories are aware of briquettes and many of them have started using and experiencing the benefits of briquette usage. In case of briquettes per kg of tea requires only about 700g of briquettes almost half as much as firewood.

Currently briquette manufacturers are in Mysore, Coimbatore, Kerala and the price range is Rs 5.2-7/kg based on quality of briquettes. The calorific value of most of the briquettes currently available is in the range of 3500-4000 kcal/kg and given that the calorific value of lantana is 4200kcal/kg there is a definite advantage. Therefore locally made briquettes from lantana could be a good source of livelihood for the community. But it is important that the briquettes have less moisture and the community members are trained to fulfill quality criteria and customer requirements.

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