

Impact of Prosopis Juliflora on Agricultural Lands.

P. Natarajamurthy*

T. Senthilkumar**

Introduction

Prosopis Juliflora (PJ) or Vilayati Babul (in Tamil VelliKaruvai) has originated in South America and it spread to USA, Central America, West Indies, Africa, Hawali and the Asian continent. PJ has more than 44 varieties. PJ is an aggressive and invading species, which has spread rapidly, almost all over the world, including India. PJ was brought into the sub-continent in year 1877 at Sind and in arid areas of Western Rajasthan in 1913. In Rajasthan, PJ species was first introduced in 1913 and then, it has spread vigorously and has covered large tracts in India.

Prosopis Juliflora, was brought into India to basically to meet the fuel wood requirements of the rural poor and also to restore degraded lands, its fire wood value is veryhigh. In Sudan, main cause for deforestation, a contributory causeto environmental degradation, was the unsustainable extraction of wood, through legal and illegal cutting of tree, to use as fire wood.The Prosopis Juliflora wood burns evenly, without spark or excessive smoke and with a calorific value of 4200 kcl/kg. The Prosopis Juliflora wood is also used as an industrial fuel for kilns in small scale industries. Further, Prosopis Juliflora wood is also used as fence posts, poles, particle boards and cardboards. Wood from bigger trees could be used for making furniture and other house hold purpose.

Prosopis Juliflora plays a positive role where natural range land grazing system is unable to cope with the demand for adequate supply of livestock forage. O.K. Koech (2010) and his team, found that, weight gain in a breed called Weaner Galla Goats in Kenya, was made possible by the administration of food supplements, prepared from the seed pods of PJ. Cattle feed, at the required level of quantity and quality is not easily available, especially in arid zones. The annual pod production, on an average, is 20 kg per tree. These pods contain nearly 10 per cent protein, 14 per cent fibre, 55 per cent soluble carbohydrates, 0.20 per cent calcium and 0.15 per cent phosphorus. These pods, when powdered as flour, are fit for human consumption also. The flour from these pods is mixed in the manufacturing process of bread and biscuits, used for human consumption.

- Assistant Professor, Department of Economics, Bharathidasan University, Trichy- 24
- Research Scholar, CYDS, Bharathidasan University, Trichy- 24

According to Sawal (2004), the livestock population has increased while conventional fodder resources have decreased due to grazing and land decline. Hence to supplement the declining feed sources for animal; Prosopis Juliflora offers a good alternative food for the cattle.

Prosopis Juliflora in India and Tamil Nadu

In India, of the total 3.28 million square kilometres of lands, 51 per cent of land area of India is arable land, forest extends over 16 per cent and permanent pasture and other grazing semi-arid regions together constitute approximately 40 per cent of the country's land surface, spreading over ten out of twenty eight States.

In Tamil Nadu, it was first introduced during 1960's in Ramnad and Tirunelveli District, and now more than 2.5 lakh acre of land is under Prosopis Juliflora in Tamil Nadu. In Tamil Nadu, it is called as Velikaruvai or SeemaiKaruvai.

Problem of Prosopis Juliflora

Prosopis Juliflora has tremendous ability to adapt itself to arid and semiarid environments and it records fast growth and multiple utility. However, rural people, farmers, development workers, researchers, ecologists and politicians consider say PJ adversely affects the agricultural crop growth, production and productivity.

PJ's root system rooted deeply, it sucks the ground water significantly higher than other plants. According to Zerayemehari Haile. (2008), around US\$ 1.4 trillion annual global economic damage, which is around 5% of the world economy, is caused by problems associated with bio-invaders.

TewodrosWakie (2012) reports that Prosopis species is one of the highly invasive plants in the world, among the 45 recognized invasive species. About 4 million hectares of land were affected. Many studies reveal that though PJ helps the of rural people, by providing livelihoods enormously, it is also considered asa unwanted plant and problematic one.

Considering these ill effects, on 26thFeb,1997, Sudan government had passed a law to eradicate the Prosopis Juliflora (Sudan Update, 1997). However, many experts remain hesitant on the question of whether Prosopis Juliflora is a threat or an opportunity, still debate is going on among researchers.Studies reveal that, there is mixed information or findings on PJ, so,there is in need to clarify whether Prosopis Juliflora is weed or wonder tree establish.

Among the top five follow lands namely, Thirunelveli, Virudhunagar,Thiruppur, Sivagangai and Tiruchirappalli, among list of backward districts in Tamil Nadu, Sivagangai district also in the list. The climate of the Sivagangai district is very dry and also hot with

low humidity. Among the Blocks of Sivagangai District, Sivagangai Block has the highest fallow land of 57,880.805 hectares. Arasanur Panchayat in Sivagangai Block is chosen because of large area current fallow land with 2173.470 hectares. The researcher has chosen total 337 samples are collected from the study area.

The past studies reveal some findings; Cheng'ole Mulindo (2004) examined the farmers' attitudes towards Prosopis Juliflora and concluded that agriculture productivity was affected in Baringo District. Significantly, Maize production went down by six per cent and farmlands were reduced and also annual yield went down to 600 kg of maize. In the High Court of **Kenya (2005)**, 40 at Nairobi (Nairobi Law Courts) Petition 466 of 2006, in June, 2005, a report was filed by two officials of Kenya Forestry Research Institute, on the experience from South Africa, in respect of the Prosopis Juliflora Plant. It suggested that the spread of the Prosopis Juliflora Plant has had serious impact on the agricultural productivity of the land (mostly for livestock production), ground water resources and biodiversity. Abiyot **Berhanu (2006)** observed that the Prosopis Juliflora has been spreading on the field and normal fertile condition would be very difficult since it involves high removing cost, time and other resources. Prosopis Juliflora has been an invading tree and proper management is required through timely usages such as grazing. Spreading of mature plant affects the farms. **Ravi Malhotra (2010)** studies that, the highest annual rainfall of around 1141.9 cm in the world has been recorded at Cherrapunji in Meghalaya. On the other hand, Western part of Jaisalmer District of Rajasthan is one of the driest parts of the country, recording around only 9 cm of rainfall in a year. **Khatkar (2012)** warns that Indian agriculture has to become more competitive due to recent deceleration of growth, particularly production as well as crop productivity. The production of all principal crops decelerated, from 3.95 per cent per annum during the eighties to 2.29 per cent per annum during the nineties. The per capita, net availability of food grains had declined from 472.6 grams per day during 2008. Rice availability had declined from 221.1 grams in 1990 to 175.4 grams per day in 2008. **Hoshino (2012)** reported that the Mesquite tree (PJ) roots could adapt to a wide variety of soil conditions. Its roots could grow upwards towards the soil surface to capitalize on little rainfall, and can also grow to depths down to 80 meter and extend laterally more than 30 meter. This is the most extensive root system of any plant in the world.

Based on the above study's findings this research has carried out with the objective of, how for agriculture and agricultural lands are affected by PJ. For the purpose of this study, Arasanoor Panchayat in Sivaganga Block and were selected. From Arasanoor Panchayat of Sivagangai Block, 337 respondents have taken as sample for the study. The

collected data were classified and presented in tables. Four types of farmers, namely, Big Farmers (BF), Small Farmers (SF), Middle Farmers, Land Less Farmers (LS) from three Communities, namely, Backward Community (BC), Most Backward Community (MBC), and Scheduled Community (SC), were involved in this study of *Prosopis Juliflora*.

Table 1 – Community wise land holding and the coverage of *Prosopis Juliflora*

Community		Land (in acre)				
		Rain fed	Wet	Garden	Total	Prosopis
BC	BF	91.5	219	16	326.5 (70.62)	53.46 (16.37)
	SF	19	72.21	6.5	97.71 (21.13)	3.9 (3.99)
	MF	6.1	32.05	0	38.15 (8.25)	14.11 (36.99)
	Total	116.6	323.26	22.5	462.36	71.77 (15.52)
MBC	BF	36	37.5	0	73.5 (29.56)	2.7 (3.67)
	SF	14.24	37.45	0	51.69 (20.79)	3.93 (7.60)
	MF	35.03	88.45	0	123.48 (49.66)	13.15 (10.65)
	Total	85.27	163.4	0	248.67	19.86
SC	BF	4.25	22.25	0	26.5	0.35
	SF	6.5	20.75	1.5	28.75 (35.60)	2.16 (7.51)
	MF	2.25	23.26	0	25.51 (31.59)	6.22 (24.38)
	Total	13	66.26	1.5	80.76	10.22 (12.66)

Compiled from primary data

The Table 1 indicates the classification of farmers into BC, MBC, and SC. The respondents are classified as Big Farmers (BF), Small Farmers (SF), Marginal Farmers (MF) and Landless (LS). The BC people owned 116.60 acres of rainfed land, 323.26 acres of wet land and 22.5 acres of garden land. In total, 462.36 acres were owned by BC in which Prosopis Juliflora grow in 15.52 Per cent of acres. Out of 248.67 acres of MBC land Prosopis Juliflora grow in 8.0 Per cent of acres. Prosopis Juliflora grow in 12.66 Per cent of acres, out of 80.76 acres, owned by SC communities. It is interesting to note that is all the classification of communities the Percentage of Prosopis Juliflora is high in Marginal Farmers. Among Marginal Farmers, the Percentage of Prosopis Juliflora is high is Backward Communities.

Table 2 - Prosopis Juliflora period of spreads in your own land and garden

Year	BC					MBC					SC				
	BF	SF	MF	LS	Total	BF	SF	MF	LS	Total	BF	SF	MF	LS	Total
Below 10 years	3	1	3	5	12	0	1	6	3	10	0	3	8	5	16
11 - 20 years	2	4	5	7	18	2	2	7	7	18	0	0	2	11	13
21 - 30 years	6	5	8	9	28	1	4	17	8	30	0	1	5	16	22
31 - 50 years	12	16	10	16	54	6	8	12	16	42	4	4	15	23	46
above 50 years	3	2	1	9	15	1	2	0	0	3	0	0	1	9	10
Total	26	28	27	46	127	10	17	42	34	103	4	8	31	64	107

Source:Compiled from primary data

Number of years Prosopis Juliflora proliferates in the respondents own land and garden is elucidated in Table 2. Out of total 337 respondents, around 42 per cent of the respondents say that Prosopis Juliflora spreads between 31 to 50 years and around 24 per cent of the respondents says that Prosopis Juliflora spreads between 21 and 30 years. Among he 337 respondents, 11.28 per cent of the respondents say, it spreads within 10 years and around eight per cent of the respondents says Prosopis Juliflora below out 50 years before. It is clear from the table Prosopis Juliflora Propagates between 21 and 50 years.

Table 3- Impact of Prosopis Juliflora on production

Particulars	BC			MBC			SC		
	BF	SF	MF	BF	SF	MF	BF	SF	MF
Production increased	6	5	3	0	0	1	1	2	3
I don't know	20	20	24	10	16	42	3	6	27
No change	0	2	1	0	0	0	0	0	3
Total	26	27	28	10	16	43	4	8	33

Source: Compiled from primary data

In table 3 the impact of Prosopis Juliflora on production is explicated. Out of 193 land owners, only 23 (11.91%) of respondents says the production has increased, while six farmers says, no change is observed. But 85 per cent of the respondents has no awareness about the impact of Prosopis Juliflora on the production. Out of 69 MBC farmers, only one Marginal farmers says production increased of Prosopis Juliflora. None of the SC farmers observed change in production of Production because of Prosopis Juliflora.

Table 4- Prosopis Juliflora improved your soil fertility

Particulars	BC				MBC				SC			
	BF	SF	MF	Total	BF	SF	MF	Total	BF	SF	MF	Total
Very good	0	0	0	0	0	0	0	0	0	0	2	2
Good	9	15	6	30	0	0	1	1	1	2	6	9
I don't know	18	11	16	45	10	16	41	67	3	6	23	32
Fertility reduce	0	2	4	6	0	1	0	1	0	0	0	0
Total	27	28	26	81	10	17	42	69	4	8	31	43

Source: Compiled from primary data

The Table 4 illuminated the impact of Prosopis Juliflora on soil fertility. Out of 193 farmers, only two marginal farmers of SC says Prosopis Juliflora has improved the soil fertility of the soil, while only seven farmers says Prosopis Juliflora reduced the soil fertility of the soil. But 150 farmers have no awareness about the impact of Prosopis Juliflora on soil fertility.

Table 5—Awareness of Respondents on Prosopis Juliflora spread in agricultural land and water bodies

Particulars	BC					MBC					SC				
	BF	SF	MF	LS	Total	BF	SF	MF	LS	Total	BF	SF	MF	LS	Total
Livestock	21	27	27	38	113	9	14	37	3	63	4	5	26	51	86
Farmyard	0	0	0	2	2	0	0	0	7	7	0	0	0	1	1
Natural	3	0	0	1	4	0	1	0	8	9	0	0	2	1	3
Birds	1	0	0	0	1	0	0	0	16	16	0	0	0	0	0
I don't know	1	1	0	5	7	1	2	5	0	8	0	3	3	11	17
Total	26	28	27	46	127	10	17	42	34	103	4	8	31	64	107

Source: Compiled from primary data

In the Table 5, the reasons for Prosopis Juliflora spread in agricultural land garden and water bodies are explained. Among 337 respondents, 262 respondents (i.e., 77.45 Per cent) says livestock is the main reason for spreading Prosopis Juliflora in agricultural land, garden and water bodies, around three per cent says farmyard, 4.75 per cent by naturals and 5.05 per cent by birds. While 32 respondents have no aware of it. Except land less respondents, others rejected that Prosopis Juliflora spreads because of farmyard.

Table 6 - land boundaries affected by Prosopis Juliflora

Particulars	BC				MBC				SC			
	BF	SF	MF	Total	BF	SF	MF	Total	BF	SF	MF	Total
Affected	23	26	15	64	6	9	20	35	1	5	31	6
Not affected	3	2	11	16	4	8	21	33	3	3	0	6
Crops not cultivated	1	0	0	1	0	0	1	1	0	0	0	0
Total	27	28	26	81	10	17	42	69	4	8	31	43

Source: Compiled from primary data

Table 6 gives the details of land boundaries affected by Prosopis Juliflora. It is interesting to note among 193 farmers; two farmers say no crops cultivated in land boundaries. In the total 193 respondents, 136 farmers says that land boundaries are

affected by *Prosopis Juliflora*, while 55 farmers says land boundaries are not affected by *Prosopis Juliflora*. Among BC, 79 per cent of the farmers says land boundaries are affected by *Prosopis Juliflora*, while 50.7 per cent of MBC and 86.05 per cent SC says land boundaries are affected by *Prosopis Juliflora*. Among communities, 33 MBC farmers says the land boundaries are affected by *Prosopis Juliflora*, while it is 16 of 81 for BC and six of 43 of SC.

Conclusion and Suggestion

It is witnessed that, the acre of cultivation in the study area has reduced from 386.5 to 177.5 which leads to decline in the production by 6569 bags other wise 3,94,140 kilograms of paddy production. Very few farmers reported that after the *Prosopis Juliflora* the soil condition for cultivation had improved. Many responded that they did not know about the result of *Prosopis Juliflora* on their lands. The respondents felt that the spread of *Prosopis*

Juliflora was through livestock and it affected land boundaries, bunds and also affected water bodies in the cultivable land. Almost all the communities recorded that the *Prosopis Juliflora* tree sucked the ground water. Respondents reported that there was loss of crops and agriculture area. There was yield loss due to sheltering animals and birds and most of the farmers said that grazing of land had shrunk due to the fast growing *Prosopis Juliflora* tree plant.

The cost of eradication through machine was very cost effective compared to manual eradication. Efficient management of *Prosopis Juliflora* is necessary for eradicating it completely. Mostly, proliferation of *Prosopis Juliflora* was through livestock which consumes *Prosopis Juliflora* pod especially goat. Hence, the Government could suggest an alternative fodder in the place of *Prosopis Juliflora*. After the removal of *Prosopis Juliflora* tree, planting alternative trees could be planned for generating good air; reduce heat and not to pollute the fertility of the soil conditions and saving of the ground water. In crop cultivable land, across bund, plant teak tree plant as the major source of income. If the Government could provide machineries through subsidy rate, the cost for eradication of *Prosopis Juliflora* could go down. If this were to be implemented, people can eradicate *Prosopis Juliflora* themselves. Government, NGO and Education institutions can conduct some awareness activities, about the adverse impact of *Prosopis Juliflora*.

Reference:

1. Koech. O.K et.al (2010), “Effects of Prosopis Juliflora seedpod meal supplement on weight gain of weaner Galla Goats in Kenya”, *Research Journal of Animal Sciences* 4(2): PP 58-62.
2. Sawal (2004), “Mesquite (Prosopis Juliflora) pods as a Feed Resource for livestock A. Review, *Asian – Australia Journal Animal Science*, Vol. 17, No.5, Pp 719-725.
3. Zeraye Mehari Haile (2008), “Invasion of Prosopis Juliflora (SW) DC and Rural Livelihoods”, „The case of Afar Pastoralists at middle Awash Area of Ethiopia“, M.Sc., dissertation, Norwegian, University of Life Science, Pp. 1-50.
4. Tewodros wakie (2012), “Utilization Assessment of Prosopis Juliflora in Afar Region, Ethiopia”, Graduate Degree program in Ecology, Colorado State University.
5. Cheng’ole Mulindo (2004), “Farmer perceptions and the impact of Prosopis SPP on food security in lowlands of Baringo district”, KARI- Regional Research Centre, Moi University. (www.kari.org accessed September, 2011).
6. Republic of Kenya In The High Court Of Kenya At Nairobi (Nairobi Law Courts) Petition 466 Of 2006: [Http://Www.Kenyalaw.Org](http://www.kenyalaw.org) – pp. 68/84.
7. Abiyot Berhanu (2006), “The prosopis Dilemma, impacts on Dryland Biodiversity and some controlling methods”, *Journal of the Dry land* 1 (2), pp. 158- 164.
8. Ravi Malhotra (2010), “Climatology”, *Climate of India*, Global Vision Publishing House, Pp. 455-483.
9. Khatkar (2012), “Emerging Trends in India Agriculture”, Edited by Anirudh Bharath ‘Agriculture and Rural Development in India, some energy issues’, Global Vision Publication, Pp. 43-57.
10. Hoshino (2012), “Evaluating the invasion Strategic of Mesquite (Prosopis Juliflora) in Eastern Sudan Using Remotely Sensed Technique”, *Journal of Arid Land Studies*, pp.22-1, 1- 4.