Available online at www.scholarsresearchlibrary.com

Scholars Research Library

Scholars Research Library

J. Nat. Prod. Plant Resour., 2011, 1 (2): 8-13
(http://scholarsresearchlibrary.com/archive.html)

ISSN : 2231 – 3184
CODEN (USA): JNPPB7

An environ-economic backbone in the economic resurgence of barren & semi-arid regions: Azadirachta Indica

[1*]G.N. Shinde and [2]Brototi Biswas

[1] Department of Physics & Electronics, Indira Gandhi College, Nanded-431603 India*
[2]Department of Geography, Indira Gandhi College, Nanded-431603 India

---

ABSTRACT

Indian Neem Tree (Azadirachta indica) is the subject matter of numerous scientific studies concerning its utilization in medicine, industry and agriculture. The study area even after being geographically suitable for Neem growth has no commercial growth & utilization of Neem. The study focuses on the barren lands of the study area to develop them as potential medicinal garden for Neem growth. The study delves into the commercial as well as environmental aspects of Neem like temperature decrease, regular rainfall, natural fertilization, natural pesticide ability etc along with the primary economic aspects of Neem through production of Neem oil, Neem cake & Neem leaves. The study has shown positive results in transforming uneconomic, unutilized barren lands into green-economic hubs, thus developing a strong environ-economic backbone for the study area. The study has proved that Neem can strike a positive balance between economy & environment & help in the economic resurgence of barren & semi-arid regions.

Keywords: *Azadirachta Indica (Neem), Marathwada region, Deccan Plateau, rain shadow region, Neem oil, Neem cake.*

INTRODUCTION

The NEEM tree (Azadirachta indica) is a tropical evergreen tree native to India. Neem is the most versatile, multifarious tree with immense potential possessing maximum useful non-wood products [1-2], though in the study area Neem remains unutilized. In India, Neem is known as “the village pharmacy” because of its healing versatility, and it has been used in Ayurvedic medicine for more than 4,000 years due to its medicinal properties. The tree is found in no less

than 78 countries world wide [3]. There are over 16.6 millions Neem trees in India [4], while in the study area Neem is about 3, 95,900 (based on field survey).

2 Objectives

1. Find out the environmental growth potentiality of Neem in the study area
2. Find out the Enviro-, agro Impact Assessment of Neem and its economic uses.
3. Find out the potentiality of study area as Neem commercial cultivation area.
4. Find out whether Neem can strike a positive balance between economy & environment & help in the economic resurgence of the study area.

3 Study Area:

Marathwada region of India which is a part of the semi-arid *Deccan Plateau* region is the study area. Nearly 32% of its 64,818 sq km area comes under the rain shadow region [5]. A total of 351757 ha of barren land is scattered throughout this region.

RESULTS AND DISCUSSION

4.1 Environmental growth potentiality of Neem in the study area

The tree attains a maximum height of 40 to 50 fts with a diameter of 30 to 40 fts. In the study area the fruit yield is almost 30-70 kgs. It is a hardy tree that grows well on most types of soil [6]. The soil pH of 7 and above is ideal for growth of the tree with annual rainfall between 450-1150 mm & temperature from 4 - 49 degree Celsius [7]. The study area has average summer temperatures of about 33^0C -45^0C with rainfall being around 700- 800 mm, with a soil pH of a little below 7. Thus the study area has every potentiality to develop itself as a major Neem producing region.

In the study area the tree was found in plenty in various locations, including the barren lands, low soil depth areas (less than 3 ft) & stony waste.

4.2 Environmental & Agro Impact Assessment.

Field work with regards to environmental aspects

A 2 Hectare agricultural field was chosen for the survey, Field A & B. The site is located at latitude 18º 25’ 05”N and longitude 76º 18’ 28” E at 342 m above mean sea level. 42 trees were randomly planted in July 2003 in 1 ha (B). Both the fields were sown with crops (groundnut). From 2005 onwards every year the leaf litters were scattered in the agricultural field B. In 2010 the following aspects were studied through soil testing:-

(1) A. *Natural Nitrogen enhancing*

Regular soil testing was done in the sampled site (Field B) from 2006 onwards. Increase in nitrogen level during four years was 18.82 kg /ha in top soil (0-15cm). Neem litter accumulation around the trees is the main source for build up of nitrogen. Thus this reduced N fertilizer use by 25%. However there was no natural increase in Nitrogen in Field A.

B. *Pest control*

There was a natural reduction of pests under the Neem plantation (no treatment was done), by about 20-25 %. However the % decreased further to 85% when spray of Neem water was applied to the crops.

A potent insecticide can be extracted from Neem seeds, leaves and bark [8]. At present India leads in the number of Neem based industries (Table 1), although the study area does not have a single of these industries.

Table 1: Number of Neem based industries world-wide

Country	Number of products
Australia	2
Canada	1
China	1
Germany	5
Kenya	8
USA	5
India	100

Source: Koul, 2009

C. *Crop yield*

The sampled area has groundnut crop. The general production using heavy chemical fertilizers varies between 8-9 quintal/ Hectare. With use of Neem pesticides, fertilizers etc the crop yield of groundnut increased by 2-3 quintal/ha for Field B alone..

D. *Soil fertility*

Neem litters enhance the basic compositions of soil. After 4 years the top soil had a natural increase in NPK content to the extent of N -18.82 kg /ha, P- 2.49 kg/ ha & K -15.5 kg/ ha. However Field A required external chemical fertilizer input.

Through natural (organic) soil fertility increase, we could do away with the ill-effects of chemical fertilizer and there was no compromise with the productivity of the soil, which in fact in comparison to Field A increased satisfactorily.

(2). *Temperature decrease*

In the forested area of Kinwat ($19^0$60' N & 78^0 25'E) & Mahur (18° 50' N & 77° 11' E) the temperature in Neem site was almost 5^0 C lower than the nearest town. The details pertaining to this survey is recorded in Table 2.

Table 2: Temperature in the forested area & towns located at 15-20 kms

Date on which observations done	Forested Area – Temperature ^{0} C	Major town at 15-20 kms – Temperature ^{0} C
20 May'2010	Kinwat-40^0 C	Kinwat- 45^0 C
20 Sep' 2010	Kinwat - 31^0 C	Kinwat – 35^0 C
22 May'2010	Kandhar- 41^0 C	Kandhar – 45.5^0 C
22 Sep'2010	Kandhar – 32^0 C	Kandhar – 35^0 C

Source: Based on field work

(3) *Regular rainfall*

Neem trees have more cloud formation ability since evapo-transpiration is more [9].

(3). *Insect repellent*
Volunteers used Kerosene lamps with kerosene & Neem oil in the ratio of 30: 1. This has shown effective reduction in room insects including mosquitoes.

(4). *Important fodder*
The chemical breakdown of leaves yielded 15 -17 % protein content. Thus Neem diet for cattle will enhance their milk yielding capacity & keep them healthier. The cattle population of this region is around 5,60,4734 [10]. Thus the region can develop itself as a dairy region.
In Kenya & Nigeria cattle are being given Neem supplement diet to enhance their milking ability [11].

(5) Traditionally, in India Neem is known for its *medicinal qualities*. A survey was carried out amongst 25 patients having Diabetes, Allergy & Heart diseases using Neem treatment & another 25 patients using Allopathic treatment. The survey tried to find out the time required for the patients under both the treatment to get well & the relapse cases after discontinuation of medication after 5 years in both the cases. The result is shown in Table 3.

Table 3: Result of Neem medication & Allopathic medication along with relapse cases

TOTAL	DIABETES				ALLERGY				HEART DIESEASES			
	1 Yr	2 Yrs	4 Yrs	Relapse	1 Yr	2 Yrs	4 Yrs	Relapse	1 Yr	2 Yrs	4 Yrs	Relapse
25 (Neem treatment)	2	10	7	6	12	5	6	2	2	5	10	8
25 (Aloepathic)	1	3	10	11	3	4	5	13	1	3	8	13

Source: Based on field work

Advantages of various Neem parts
1. **Neem oil**: useful for pest control, cosmetics, medicines, etc.
2. **Neem seed cake** : Natural fertilizer & insecticide
3. **Neem leaves**: useful for chickenpox [12], increase body immunity, reduce malaria fever, treating foot fungi, neuromuscular pains, useful against termites, grain storage.
4. **Neem bark and roots** : control fleas & ticks on pets, skin infections, treats diabetes, AIDS, cancer, heart disease, herpes, allergies, ulcers, hepatitis & several other diseases.

4.3 Study area as a potential Neem commercial cultivation area/ medical gardening.
Neem tree is being grown on a commercial basis in US, Australia [13]. There is no artificial plantation/ medicinal gardening in India. It is a debatable issue as to why people in the study area will prefer to cultivate Neem instead of cultivable crops which will give them quick returns. So the barren lands have been taken into consideration which will turn them into economically & environmentally productive units. Only 40 %f the total barren lands of the study area has been considered for reasons like stony waste, shallow soil depth, other afforestation program etc. Thus the exact amount stands at 140702.8 Ha. The total number of trees being 56281120 (400 trees/ ha) with a casualty replacement of 20%, (survival/Ha 320) = 11256224. The costing of Neem plantation includes the following factors- (1)Site preparation (2)Initial ploughing (3)Alignment & staking (4)Digging of pits (30 cm3) & refilling of pits after mixing FYM & fertilizer,

insecticides (5) Cost of fertilizer @100 g /plant (6) Cost of plants & transport, (7) Planting & replanting @ 100 plants per /MD (8) Irrigation @ 5 times / yr during dry months only. The total cost varies from 1st year to 10th year. After 10th year there are no input costs.

4.4 Framework of the Neem industry

Over the last 20 years the global price of Neem seed has gone up from Rs300/ ton to current levels of Rs3000-4000/ ton with Indian growers & suppliers dominating the market[11-15]. The supply for Neem market is just 20- 30% of the demand.

4.5 Potential of Neem based industry in the study area

The production cost for Neem oil & cake is Rs 7/ Kg. 150 kg of Neem seed yield 100 kg cake & 25-30 kg Neem oil. 40 kg of fruit yields 5.48 kg kernel. Neem can be profitably utilized from 5th year & leaves 9th year onwards. The economies of the medical garden with regards to Neem oil, cake & leaves sale based on market rate is as shown in Table 4.

Table 4: Medical gardens' total yield

Year	Nimboli (Neem fruit) yield in Kg	Neem Kernel in kg	Oil yield in kg	Cost of oil @ Rs 80/ Kg	Oil cake yield in kg	Cost of cake @ Rs 5/ Kg	Neem leaves in Kg @ 6 kg /tree	Cost of leaves @ Rs 7/ Kg
5	28140600	38552567	6425428	514034240	25701711	128508555		
6	393967840	53973594	8995599	719647920	35982396	179911980		
7	562811200	77105134	12850856	1028068480	51403422	257017110		
8	844216800	115657701	19276284	1542102720	77105133	385525665		
9	1125622400	154210268	25701712	2056136960	102806844	514034220	337686720	2363807040
10	1688433600	231315402	38552568	3084205440	154210266	771051330	337686720	2363807040
11	1688433600	231315402	38552568	3084205440	154210266	771051330	337686720	2363807040
12	2814056000	385525670	64254280	5140342400	257017110	1285085550	337686720	2363807040

Source: Generated by the authors

Nimboli (Neem fruit) /year yield = (5kg in 5th year, 7 kg in 6th year, 10 kg in 7th year, 15 kg in 8th year, 20 kg in 9th year, from 10th year onwards 30 kgs)[1]

Table 5: Cost and income of Neem plantation

Particulars	Year 1	Year 2	Year 3	Year 4	Year 5	Yea r 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12
Total Cost (Rs in Crore)	104.16	50.14	41.78	26.31	34.05	37.92	41.79	41.79	41.79	41.79	---	---
Income	-	-	-	-	64.25	89.95	128.50	192.76	493.39	621.90	621.90	878.92
Net Income	**-104.16**	**-50.14**	**-41.78**	**-26.31**	**30.2**	**52.03**	**86.71**	**150.97**	**451.60**	**580.11**	**621.9**	**878.92**

Source: Generated by the authors

[1] Conversion of Indian Rupee(Rs) with American Dollar : Rs 45 = 1$, Rs 1,00,00,000 = 1 Crore

Thus the cost of Neem plantation & the income from it is shown in Table 5. Income starts generating from 5th year onwards. After 10th year there are no input costs.

Thus the economy of the study region can turn around with this type of green economy. Here only the basic parent industry (Neem oil & cake) has been taken into account. The downstream industries that are cosmetics, toiletries involving Neem has not been take into consideration. If these criteria taken into consideration then profit margin would have multiplied by several times.

CONCLUSION

All over the world there is almost no economic activity which directly enhances environmental maintenance. However this economic activity can help revamp the environment. The soil fertility of the study area will be naturally benefited through green manuring of Neem, nitrogen fixation capability, water holding capability, pest control etc. Features like regular rainfall, temperature decrease will help in the development of the environment.

The study area which otherwise is a barren tract can evolve into a potential Neem commercial growth site can thus strike a balance between economy & environment & help in the economic transformation of the region. The study region can thus profit itself through the numerous economic and environmental advantages of Neem.

REFERENCES

[1] Girish K & Shankara B. S, "*Neem – A Green Treasure*", Electronic Journal of Biology, **2008**, Vol. 4(3): pg102-111.
[2] Koul. O & Wahab. S, "*Neem: Today and in the New Millennium*", Springer Science, **2004**, New York, pg 1, 8.
[3] Forster. P, "*Status report on global Neem usage*" Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ) GmbH, **2000**, Germany, IInd edition, pg 7,.
[4] Neemfoundation, www.Neemfoundation.org/Neem-articles/Neem-updates/vol-v-no1/role-of-small-scale-industries-in-harnessing-the-true-potential-of-Neem.html
[5] IIRD, http://www.iird.org.in/marathwada.htm
[6] Panda H, "*Medicinal Plants Cultivation and their Uses*", Asia Pacific Business Press, **2010**, Delhi, pg 201-213.
[7] Neem products, http://www.Neem-products.com/Neem-cultivation.html
[8] http://agroforestry.net/afg/book.html
[9] Biswas. B, "*Glimpses of Science of Regional Planning techniques adopted in medieval Nanded district of Maharashtra (India)*", Medha, , **2010**, Vol-I, pg 61-70.
[10] Cattle Census report, Nanded district, **2006**.
[11] Nzioka T, "*Conservation and commercialization of the multi-purpose Neem tree*", paper presented in International conference of "Marketing Strategies and Human Capacity Strengthening to Realize the Economic Potential of Underutilized Species" held at the University of Macerata, Italy, **2004**.
[12] Neemfoundation, www.Neem-products.com/Neem-leaves.html.
[13] http://www.Neem-products.com/Neem-oil.html
[14] http://www.twnside.org.sg/title/pir-ch.htm
[15] NIIR, "*Neem and Allied Products*", Asia Pacific Business Press, Delhi, **2010**