Appendix-II

AUTHOR'S

RESEARCH PROJECT

ON

FOREST FOR FOOD AND DEVELOPMENT

SANCTIONED BY

DEPARTMENT OF SCIENCE AND TECHNOLOGY

ON WHICH

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in 1996

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Justification and background

The scenario as manifest at present and if continues to unfold as of now, is fraught with grim perspectives. The exploding population, its rising expectations and the ad-hoc measures to meet them through predatory technologies, will eventually end up in irretrievable crisis. The living patterns and high-tech models of development inextricably dependent on non-renewable sources, unstable as they are, cannot be sustained for long. The whole edifice is bound to crumble down soon. The un-satiable mad race is destroying simultaneously the vitals of nature, its renewable resources and the very life-sustaining systems. The air, water and soil which are three basic environmental constituents for life are being increasingly damaged. The pollution of entire environment, has at many places, reached beyond its redeeming, rejuvenating capacity. The ecological imbalance as a result of destruction of tree cover from most parts and with it the various life-forms, has shattered the intricate chain of most of life-supporting systems.

There is yet some hope and something left to cling to for survival. The sands of time are running out fast and concerted efforts are needed before it is too late. The foremost concern should be to save air, water and soil from further pollution and to retrieve the damage already done. The most wide-spread and extensive damage is because of high-tech, capital-intensive, predatory agriculture based on irrigation dams, chemical fertilisers and pesticides, all of which are polluting soil, water and air. Our seas, rivers and other water resources are getting more and more polluted by agricultural and industrial effluents causing serious threat to aquaflora and fauna. The air we breathe is also highly polluted with toxins and pathogens beyond permissible limits. The harmful chemicals are getting into human system through edible crops because of soil pollution by pesticides, fertilisers and irrigation dams.

Extensive tracts of forests have been cleared to make way for agriculture. This has accelerated soil erosion and also accentuated flood havoc because of reduced infiltration and increased run off on denuded hill slopes, Climatic pattern has also been disturbed resulting in frequent droughts. This has also disturbed the entire ecological balance. About a 1000 plant species and 3000 species of animals and

birds on earth are already extinct and more are on the verge. With loss of habitat i.e. trees, the animals, birds and insects disappear and because later are pollinating, dispersal agencies, further regeneration of plant species stops, thus a vicious circle of destruction sets in, putting even the human survival in jeopardy.

Even the aggressive agriculture of high yielding hybrids will not be able to cope with the growing needs. The yields have already reached the plateau and have started declining. There is an alternative, viable and stable, organic and symbiotic, recycling and replenishing, non-polluting yet progressively productive. The alternative is “forest based model of life”, which will provide cross fertilisation of social and biological sciences to harness productive potentials in harmony with entire biome, the whole environment.

Polyculture mixed forests of naturally evolved species once raised and established and if judiciously managed will be everlasting, self-regenerating, self-fertilising, self-watering and self- protecting. They will provide edible seeds, nuts, beans, fruits, timber, fuel, gums, resins, fibres, flosses, dyes, honey, wax, lacquer and everything to meet the requirements of developing as well as developed societies. The yield of edible seeds, nuts, beans, fruits, will be 2 to 5 tonnes per hectare, per year much more than from any high-tech agriculture and that too without any recurring cost on ploughing, seed, irrigation, fertilisers, pesticides required in agriculture, crop after crop, year after year. The agricultural crops utilise soil nutrients up to one or two feet depth of soil only whereas the questing roots of trees (e.g. Prosopis cineraria) go down up to 50 metres depth to utilise inexhaustible store house of nutrients. The yields will also be not significantly affected by droughts or excess rains as in case of agriculture. There will be no need of costly irrigation dams and channels, fertilisers, pesticides etc., which are all polluting and degrading. Whereas agricultural crops can be raised successfully only on one-tenth of earth surface, there are trees and shrubs for good and bad soils, slopes and sand dunes, water-logged and saline areas, degraded and eroded lands, hills and plains, sea-costs and marshes etc. The polyculture forest is permaculture which will be self-sustaining economically also and there will be no need for huge subsidies as for agriculture. Even in U.S.A. there are subsidies totalling 21 billion dollars for agricultural produce valuing 22 billion dollars

(1984). If all direct and indirect subsidies are taken into account agriculture is not at all an economic proposition in the present context of skyrocketing input costs.

Human ingenuity has constantly been developing technologies to make life more and more comfortable by obviating the drudgery involved in execution of various works. Recently the progress has been phenomenal as a result of spectacular advances in electronics particularly in its sophisticated fields of computronics, robotry etc. It is surprising that man has not thought of doing away the cumbersome drudgery involved in agriculture. The point is as to why go for all the drudgery of raising agricultural crops when the same can be done by nature in polyculture forest more efficiently and economically without inherent hazards of agriculture. The polyculture forest will provide enough food to cater to ten times present population and in addition numerous other products for various industries, village, small and big. Being labour intensive it will create unlimited job opportunities for young and old, men and women, infirm and strong, able and disabled, skilled and unskilled.

This project will go a long way to evolve and promote a model of development which will steer clear of the most of the evils of present pattern of development.

Objective:

The basic objective is to evolve, propagate, and establish a forest based model of life. It will involve intensive research, demonstration and extension programme to be taken up in integrated phases.

PHASE I

SURVEY & DOCUMENTATION

In the initial first phase of the programme survey and documentation of information primarily regarding food value of various forest trees and shrubs will be taken up from the available literature as well as by surveying the food habits of important forest tribes.

Requirement of staff

1. Project Director
2. Botanist
3. Sociologist
4. Driver
5. Steno
6. Accounts Clerk
7. Peon

Requirement of Vehicles, equipment etc.

1. Jeep
2. Tentage
3. Office equipment

Period required for Phase I

The programme under Phase I will be completed within a period of two years.

PHASE -II

Analysis of forest seeds, beans, nuts for nutritive food value as well as toxity if any and also development of palatable and acceptable recipes.

On the basis of information gathered during Phase-I, the programme for analysis of forest seeds, beans and nuts will be taken up to find out their nutritive food value and toxity if any. Simultaneously suitable, palatable and acceptable recipes will be developed. Both the Phase-I and Phase-II can be taken up simultaneously or in sequence. It will be more expedient for realisation of the basic objective of the project if the Phase-I and II are taken up simultaneously.

Requirement of Staff

1. Project Director
2. Chemical Analyst
3. Food Technologist
4. Lab. Assistants
5. Steno
6. Accounts Clerk
7. Driver
8. Peon

Requirement of Laboratory equipment & material

1. Infrared Spectrophotometer
2. U. V. Spectrophotometer
3. High Pressure liquid Chromatograph
4. U. V. Detector, Video and Print out
5. Gas liquid chromatography apparatus
6. Column and thin layer chromatography apparatus
7. Food processing apparatus
8. Glass ware, ovens and other utensils
9. Chemicals and other materials

Period required for Phase -II

The analysis of various potential food resources available form forest for their nutritive value as also for toxity if any and development of suitable and acceptable recipes will be completed in two years.

PHASE -III

DEMONSTRATION AND EXTENSION

During this final phase of the project, results of findings under Phase-I and Phase-II will be propagated through demonstration and extension programme. It will include organisation of lectures, seminars, publication of pamphlets and Radio and T.V.

coverage. Ten demonstration plots will also be laid out in main agro-climatic zones to demonstrate technical feasibility and economical viability of forest farming.

Requirement of Staff

1. Project Director
2. Forest Rangers
3. Foresters
4. Driver
5. Steno
6. Accounts Clerk
7. Peon

Period required for Phase III

To educate people about food value of forest and also about technical feasibility and economic viability of forest farming, it will require a concerted effort for at least a period of 15 years, The one hectare demonstration plots for forest farming in main agroclimatic zones will start yielding full benefits after 10 to 15 years, though annual returns at par those from agriculture will commence from first year of the plantation from inter-cropping, medicinal plants.

Note: The project was resubmitted in the prescribed pro forma to the Department of Science and Technology. A meagre sum of Rs. 1.10 Lakhs only was sanctioned and Ms Sneh Sharma could analyse and evaluate nutritional status of 20 forest seeds only. The results are given in the following tables.

Table-3

PROXIMATE ANALYSIS

S. No.	Name of Seeds	Moisture	Ash	Protein	Fat	Crude Fibre
1.	Holoptelea integrifolia	5.33	4.12	30.10	6.51	3.14

2.	Dendrocalamus strictus	7.80	11.90	13.10	1.20	0.90
3.	Diospyros melanoxylon	6.27	2.53	19.24	13.59	1.69
4.	Terminalia belerica	5.59	5.04	35.82	39.15	0.63
5.	Prosopis chilensis	5.28	2.07	38.57	32.57	4.18
6.	Prosopis cineraria	4.23	5.19	16.91	12.22	3.68
7.	Bauhinia purpurea	6.63	2.28	35.25	19.63	3.47
8.	Capparis decidua	4.75	4.50	21.43	16.58	7.68
9.	Pithecolobium dulce	7.08	2.85	28.88	19.72	6.22
10.	Stercuila urens	4.14	4.18	7.47	32.57	3.35
11.	Acacia catechu	7.68	4.50	31.88	7.99	3.38
12.	Acacia leucophloea	9.16	6.18	27.24	16.20	6.80
13.	Ziziphus mauritiana	21.30	1.30	2.15	0.63	4.15
14.	Butea monosperma	5.45	6.69	16.42	25.93	2.50
15.	Cassia fistula	3.16	9.04	13.35	10.77	2.51
16.	Mangifera indica	5.93	2.47	15.09	7.56	3.38
17.	Buchnania lanzan	3.00	3.44	18.70	39.10	2.10
18.	Moringa oleifera	3.99	8.23	38.10	3.58	5.39
19.	Tamarindus indica	3.50	2.59	15.09	8.19	1.06
20.	Acacia nilotica	4.63	5.14	7.23	20.30	3.65

Table No.4

MINERAL ELEMENTS COMPOSITION

S. No.	Name of Seeds	Calcium (mg/100gm)	Phosphorus (mg/100gm)	Iron (ppm)	Sodium (ppm)	Potassium	
1.	Holoptelea integrifolia	382.01	551.90	32.03	0.50	4.0	
2.	Dendrocalamus strictus		36.00	162.00	7.85	0.04	4.9
3.	Diospyros melanoxylon		592.16	133.48	330.40	0.50	3.0
4.	Terminalia belerica	255.14	348.80	4.30	0.20	5.9	
5.	Prosopis chilensis	258.00	563.40	19.43	1.60	6.7	
6.	Prosopis cineraria	273.79	647.52	83.95	0.50	7.8	
7.	Bauhinia purpurea	498.92	466.67	11.63	0.60	7.2	
8.	Capparis decidua	410.06	582.51	75.33	0.70	6.8	
9.	Pithecolobium dulce	309.18	550.81	97.43	0.05	3.7	
10.	Stercuila urens	523.33	1125.69	20.72	0.60	7.3	
11.	Acacia catechu	431.10	372.91	23.18	0.80	6.3	
12.	Acacia leucophloea	515.90	718.30	97.74	1.80	6.8	
13.	Ziziphus mauritiana	260.33	133.00	0.52	0.50	5.9	
14.	Butea monosperma	292.13	272.26	133.00	0.80	7.2	
15.	Cassia fistula	68.50	1167.32	209.26	0.70	7.0	
16.	Mangifera indica	44.07	107.29	1.90	0.40	7.3	
17.	Buchnania lanzan	138.09	430.00	7.70	0.20	3.7	
18.	Moringa oleifera	23.27	522.02	23.87	0.70	5.0	
19.	Tamarindus indica	139.30	271.02	135.77	0.40	5.0	
20.	Acacia nilotica	566.44	450.23	21.04	0.90	6.8	

Data from Ph.D. thesis of Ms. Sneh Sharma, Research Scholar, University of Rajasthan. Jaipur.