

Report of the
**Survey of Grassroots Initiatives
in Sustainable Cultivation**

*Resources and Livelihoods Group
Prayas, Pune, India*

January 2004

Table of Contents

1. Introduction

2. Study Sample and Contact Databases

3. Analysis and Findings: Profile of GISCs

4. Analysis and Findings: Practices followed by GISCs

5. Lessons in Adoption of Sustainable Practices

6. Overall Lessons, Conclusions and Future Possibilities

7. Annexure:

- (i) Definition and Explanation of Important Terms used in the Survey
- (ii) Practices and Methods in Sustainable Cultivation: Classification based on Survey Data
- (iii) Methods and Techniques in Sustainable Cultivation: Classification based on Survey Data
- (iv) Sustainable Cultivation Practitioners and their Techniques
- (v) Yield Levels:
 - (a) Yield Potentials
 - (b) Yield Levels
- (vi) Contact Database:
 - (a) Validated (Interviewees)
 - (b) Validated (other than interviewees)
 - (c) Non-validated
- (vii) Survey Preparatory Material:
 - (a) Areas of Study
 - (b) Final Output Template
- (viii) Survey Tools:
 - (a) Contact Establishment Letter
 - (b) Questionnaire No. 1- Contact Data
 - (c) Guidelines for filling the questionnaire
 - (d) Questionnaire No. 2- Profile Data
 - (e) Practices Documentation- Technique Chart
- (ix) Map of the Survey Area

Bibliography

List of Tables and Diagram

- Table 1. Study Sample and Responses
- Table 2. Regional Distribution of Contact Database
- Table 3. Tools and Implements Used by Sustainable Cultivators
- Table 4. Tillage Operations followed by Sustainable Cultivators
- Table 5. Cropping Seasons of Sustainable Cultivators
- Table 6. Duration of Engagement in Sustainable Cultivation (years)
- Table 7. Gestation Period to Achieve Satisfactory Yield
- Table 8. Land Area Under Sustainable Cultivation (per cultivator)
- Table 9. Type of Soil Inputs (Organic vs. Inorganic)
- Table 10. Type of Pest Control Inputs (Organic vs. Inorganic)
- Diagram 1. Practices of Low-External-Input Sustainable Intensive Cultivation (LEISIC)

1. Introduction

In Phase I, the ReLi Group had the opportunity to review LEISA literature to study some grassroots initiatives in sustainable cultivation (hereafter referred as GISC), and examine their relevance to the livelihood of the most vulnerable sections (MVS) of the society. In this phase II, we have extended the work of survey and examination of GISC especially from various parts of Maharashtra. In different regions of Maharashtra, many individuals and organizations have made significant progress in developing practical organic farming and sustainable cultivation practices and methods. Hence, interacting with these individuals and organizations has provided the Prayas- ReLi group with more information on the 'content' aspects of sustainable cultivation. This content especially pertains to information on the various practices of sustainable cultivation followed at the grassroots.

The main focus of the survey was on documenting the practices and methods followed by the sustainable cultivation practitioners. A brief review of the practices and methods of sustainable cultivation reported by the practitioners has been included in this report (Refer Annexure II, III and IV) along with other relevant findings of the survey. The introductory information pertaining to objective, methodology, activity development and the limitations of the study have been presented in this first section (Section 1). The response to the survey achieved till date, the sample emerging from the response and the status of the database has been presented in Section 2. In Section 3, an overview of the profile of the surveyed GISCs has been presented while Section 4 covers the analysis and findings based on the documentation of practices of sustainable cultivation. The major portion of this section comprising of the introduction to the actual practices of sustainable cultivation followed by the GISCs has been presented separately in Annexure II, III and IV. During the survey important insights were gained pertaining to the process of adoption of sustainable practices by the GISCs. These have presented in Section 6. The last section (Section 7) concludes the report by summarizing the overall lessons and conclusions along with the list of probable activities in future that can be taken based on the outcome of this survey.

Survey questionnaires and other tools used during the survey are presented as different subsections within the Annexure VIII. The survey preparatory material listed in Annexure VII comprises of the areas of study in different stages of the survey and the template of the final output (especially pertaining to practices documentation) prepared at the beginning of the survey. Complete contact list of the survey interviewees and a sample list of other type of contact databases collected during the survey can be found in Annexure VI. Annexure V lists down the yield values for the various crops reported by the survey respondents that have been cultivated using sustainable practices. Map of the survey area have been presented in Annexure IX. The definitions and explanation of the various terms used in the survey presented in Annexure I may be useful as background reading since the same have been frequently referred further in the report. Various types of literature referred during the survey have been listed in Bibliography at the end of the report.

1.1. Objective of the Survey

Reversing the top-down flow of development discourse and mainstreaming the Sustainable Livelihoods (SL) perspective in development practice are the broad goals of the project. The survey of GISC is guided by the second goal of mainstreaming the SL perspective in development practice to be pursued by working towards the objective of providing theoretical support and capability building of the GrOs.

Drawing from these substantive and strategic objectives mentioned in the project proposal and Action Plan for Phase II, the objectives of this particular activity (the survey of GISC) could be articulated as follows:

- To study the various grassroots initiatives in sustainable cultivation (GISC) that are successful in creating direct impact on enhancement of productivity of land through environmentally sustainable means.
- To obtain 'content' level inputs for the Grassroots Organisations (GrOs) in the form of practical knowledge about the various practices of 'Low-External-Input Sustainable Intensive Cultivation' (LEISIC) for improving the nutrition and food security of the most vulnerable sections (MVS), i.e., tribals and women especially in the region of Konkan.

The outputs and outcomes of the above study is expected to help the GrOs in providing them with content inputs which will help them to evolve concrete program at the ground and use the same for the policy and program advocacy that will be undertaken by the GrOs in future. It will also help in capability building of the GrOs and community at large by providing inputs in the form of practices of sustainable cultivation and also by providing the contacts of the GISCs for future interaction and information sharing.

1.2. Methodology and Stages in Survey

As is clear from the above set objectives, the emphasis of the study is on the documentation of practices, methods and techniques (P-M-T) of sustainable cultivation (please refer Annexure I. for explanation on P-M-T). Hence, this was the primary study area during the survey. The methods employed for the study were:

- Indirect survey done through mailing of structured questionnaires,
- Field visits for direct field observations, and unstructured personal interviews.

The study was divided into following stages:

1. **Preliminary Stage**, which involved the process of search for secondary information about the GISCs in Maharashtra and contact establishment with the GISCs.
2. **Intermediate Stage**, in which information on the brief profile of the GISCs was collected through the responses gathered from the questionnaires mailed to the GISCs.
3. **Advanced Stage**, which involved the process of collecting information on P-M-T of selected GISCs through visits, field observations and interviews.

(Please refer the Annexure VII. A) Areas of Study, which gives brief introduction to the study areas of the above three stages.)

The actual steps taken while working on the above three stages were as follows:

1. **Listing:** In this step, a comprehensive list of the GISCs was prepared through continuous information gathering from various sources like published material, contacting the resource persons, references from the field studies being conducted by ReLi Group for other purposes, cross-references from the identified GISCs and prospecting in various social events like seminars and conferences. The listing involved mainly the names and contact information of the people engaged in sustainable cultivation. Thus, this listing forms the preliminary stage of the study.
2. **Contact Establishment:** The first contact was established with the GISCs by mailing a letter, which explained the survey activity, objectives and the stages of the survey. Introduction to the overall objectives of the ReLi Group and the various activities undertaken was also done. This allowed us to initiate a process of sharing the Group's work and reach out to various grassroots actors. It also helped convey the need to collaborate on the various social issues that need to be addressed collectively.
3. **Profile Building:** After the initial contact, second level of contact was made to those who responded to the first contact letter. In this step a questionnaire was mailed to the respondents for obtaining a brief profile of the GISCs. This formed the intermediate stage of the study.
4. **Personal Visit:** The database of the profiles thus gathered was used to select the sample for personal visit and interviews. Sample was selected in such a way as to represent all the five regions of Maharashtra viz. Konkan, North Maharashtra, Western Maharashtra, Marathwada and Vidarbha (Please refer Annexure IX. Map of Survey Area). Detailed information was collected about the sustainable cultivation practices followed by the GISCs through field observations and interviews.
5. **Data Processing and outputs:** In this survey, there are three levels of processing and subsequent outputs. In the preliminary stage, the contact data was processed and a comprehensive list of the GISC, classified according to the different regions in Maharashtra, is prepared. The same will now be helpful to the GROs as well as a wider audience for establishing contact for knowledge sharing and networking with the GISCs from their own region. In the intermediate stage the brief profiles of the GISC is prepared under different classifications (e.g. classification based on the type of crops cultivated) so that the GROs having specific problems can get in touch with the relevant GISC. In the advanced stage of the study the output is in the form of the P-M-T followed by the GISCs. This will directly benefit the GROs and the MVS of the community in the form of building their capabilities in sustainable cultivation as well as by direct application of those practices of sustainable cultivation that they find relevant to their own situations.

1.3. Process of Activity Development

In the first phase of the execution of the activity, much of the work was focused on evolving the precise objectives and the overall methodology. The survey has been

divided into three stages as mentioned in the earlier paragraph. Specific areas of study were identified for each stage (Please refer Annexure VII. A.) Survey tools were developed in this first phase for different stages (Please refer Annexure VIII. Survey Tools-A to E). The final output expected at the end of the survey, which is called as Final Output Template (FOT) was evolved right in the beginning to bring in proper focus in the survey. The study areas for various stages were later selected based on this pre-decided FOT (Please refer Annexure VII. B. Final Output Template). The broad criteria for identifying the P-M-T that may be considered under Low External Input Sustainable Intensive Cultivation (LEISIC) were developed based on the LEISA criteria defined by the Center for Research and Information on Low External Input and Sustainable Agriculture (ILEIA, Netherlands). The scope of the study puts limitations to carry out any in-depth evaluation of the GISCs based on all the above criteria, however the LEISA criteria provides the guiding principles for assessing the GISCs for their utility for LEISIC. Different terms like GISCs, Practices-Methods-Techniques, LEISIC that are being used in the survey were pre-defined to provide clarity throughout the study (Please refer Annexure I. Definition and Explanation of Important Terms used in the Survey).

In the second phase of the execution of the activity, the initial listing and database building began. This phase required a lot of effort and time in identifying the GISCs and then collecting the contact information. Later, the first contact was established through an introductory letter along with the reply card attached to the same (Please refer Annexure VIII. A. Contact Establishment Letter). The GISCs responded through the reply card by sending in names and contact information of more GISCs. In this way, the database on GISC was further expanded through cross-referencing. Copies of the questionnaire for collecting information on the profile of the GISC were posted to all those who responded to the first contact establishment letter. The questionnaire was sent along with a self-addressed and self-stamped envelope so that respondent need not have to bear any cost of replying with the questionnaire. The response to the six paged questionnaire mailed was not satisfactory. Hence the questionnaire was simplified and made into just two pages. This was resent to the non-respondents and also to the newly identified GISCs. This improved the response rate considerably.

The third phase of the activity execution involved personal visits to selected GISCs for collecting information on the sustainable cultivation practices being followed by the GISC on the field. There were nine such rounds of field visits spread over a period of about one year starting from December 2002. Information was collected from the GISCs on various aspects of the P-M-T through unstructured interviews and visiting the farms, wherever it was possible for on-site observations. Considering the diverse nature of GISCs and their field conditions the unstructured format provided flexibility in conducting the interview and the field visit. But at the same time the unstructured format required continuous focus during the field study on the objectives of the survey. Hence a chart was developed for recording the technical information pertaining to various practices (Please refer Annexure VIII. E. Practices Documentation- Technique Chart). The other problem being faced was that the respondents normally were reluctant to share every detail of their farming practice right in the first meeting. Hence an attempt will have to be made to follow-up with the GISCs for filling-up the gaps in the details of specific practices even after the formal survey has been completed.

It was planned to execute the three phases one after the other. But there has been a large time lag or delay in the replies to the profile-building questionnaire. Hence to avoid losing out time on waiting for the replies and to enable completion of all the tasks in the stipulated project duration it was decided to initiate the third phase of personal visits even in the absence of the replies to the profile-building questionnaire. The database of GISCs was also seen to be building only at a gradual pace. Hence all the above three phases of activity execution were performed simultaneously instead of one phase after the other as planned earlier.

1.4. Limitation of the Study

The limitations of the study arising from the scope of existing survey and also from the methodology adopted have been summarised as follows:

- The sample selected was based on the information gathered from the available literature and cross-referencing. Hence the sample was developed based on the already known sustainable cultivators. There was no direct investigation at the grassroots for developing the contact database. Hence there is a possibility that some genuine sustainable cultivators may not have been included in the survey database. This may have happened especially in the case of those cultivators who are located in the interiors of particular regions e.g. the cultivators in hilly regions and the tribal cultivators.
- The questionnaire was designed for ease of responding. However responding to this questionnaire did require some minimum level of literacy and interpretation, which may have been a hindrance for some of the responding cultivators especially the non-literates.
- Since many cultivators are not used to maintaining details of their agriculture operations, there was a limitation on the data collection especially the parameter level data about the inputs and outputs. Along with this constraint there is also an inherent tendency of not presenting all information to the interviewer right in the first meeting. This reluctance to share the information some times posed a limitation on data collection.
- The scope of practices documentation was defined through the detail technique chart. However, when the contact database of the sustainable cultivators increased beyond expectations it was decided to lower down the scope of detailing of the practices so as to accommodate maximum number of these cultivators for practices documentation through personal visits. However, certain important methods and techniques were documented in detail.

* * *

2. Study Sample and Contact Database

2.1. Survey Response and Sample

The sample for the survey and the responses received for different stages of the survey are summarized in the Table 1.

Table 1. Study Sample and Responses

	Stage wise Sample and Responses *	Number of People
1.	Total Contact Database Built	301
2.	Introductory Letters Mailed	137
3.	Postcard Response Received and Profile Questionnaire Mailed	64
4.	Profile Questionnaire Mailed (other than those who responded by postcards)	29
5.	<i>Total Profile Questionnaire Mailed (3 + 4)</i>	93
6.	Response to Profile Questionnaire Received	57
7.	Visits and Interviews Conducted	41
	Total Contact Established (Includes any one of response received through either postcard or questionnaire or interviews, but excludes overlaps within the type of response)	108

* Note: The contact database was build gradually and it continued till the end of the project period. Hence all those added late in the database were not contacted. This is clearly reflected in the fact that the number of people to whom the introductory letters were mailed is lesser than the number of people included in the contact database.

- **Contact Database:** Contact database was build through exploratory methods without any direct investigation at the grassroots to identify and list the sustainable cultivators. The database mainly built on the information from the available literature and cross-referencing. Along with the listing of actual cultivators the database also includes resource persons and organizations involved in various aspects of sustainable agriculture.
- **Profile Questionnaire:** Profile questionnaire were addressed initially to only those who replied to the first introductory letter. To avoid the time lag arising between the receipt of postcard reply and replies to the questionnaire, it was later decided to address the questionnaire to all the new entrants in the contact database directly by skipping the stage of postcard replies. However some time was lost in this process.
- **Interviews:** The sample for interviews was selected on three criteria viz. profile of the GISC, region of the GISC and overall popularity (i.e. locally recognized) of the GISC in the region. The important factor for consideration was the relevance of the type of sustainable cultivation carried by the GISC for practices documentation. At times when it was necessary to take prior appointment of the interviewees, availability of contact numbers was also one of the selection criteria.

2.2. Contact Database

Following were the sources used for developing contact database:

- **Compiled Lists:** Published literature that contained list of contacts related to sustainable cultivation was used as starting point. The main literature referred for this purpose has been included in the list of references sighted at the end of the report (Please refer the Bibliography presented at the end of this report).
- **Cross-referencing:** People identified from the compiled lists were requested to suggest names and contact information of more people involved in sustainable cultivation in their region. Close associates of Prayas were also asked to add to the contact database.
- **Publicity:** It was publicly informed about the activity and asked to provide names and contact information of GISCs from their regions. The public occasions used for the purpose were seminars, consultations, etc.

2.2.1. Status of Contact Database

- **Validated Contact Database:** This is the database of people who have replied to the survey in one or the other forms involved in various stages of the survey like postcard replies or questionnaire replies or direct interviews. Since these replies ensures that the contact database is accurate and that the cultivators or resource people are functional in the field of sustainable agriculture, the same has been termed here as Validated Contact Database (Refer the Annexure VI. Contact Database - A and B). Such contact was established with 108 people.
- **Non-validated Contact Database:** This comprises of contact databases procured from various sources (as listed above) which were not validated i.e. either the people have not responded or they have not been approached during the survey (Refer the Annexure VI. Contact Database - C.). Such database includes contact information of 193 individuals and organizations.

2.2.2. Regional Distribution
In Table 2 the region-wise breakup of the contact database built is presented. The sampling for interviews and field visits was based on these regions. These are the six broad regional groups in Maharashtra that represent the revenue divisions for administrative purpose (Please refer the Annexure IX. Map of the Survey Area).

Table 2. Regional Distribution of Contact Database

	Region*	Validated Contact Database	Non-validated Contact Database	Total
1	Western Maharashtra	29	50	79
2	Vidarbha	32	80	112
3	Konkan	16	26	42
4	Marathwada	15	27	42
5	Mumbai	06	7	13
6	North Maharashtra	08	3	11
7	Outside of Maharashtra	02	0	2
	Total	108	193	301

As seen from above table, the survey comprises of people representing all regions of Maharashtra. Maximum numbers of GISCs are from Vidarbha region. This may be due to the long history of adverse impacts of modern agriculture faced by farmers in Vidarbha (as is evident from high occurrences of suicides in farmer community in Vidarbha) and hence the need arising for moving towards sustainable agriculture. Generally regions with a long history of cash crop cultivation and high external inputs are among the top rankers in the numbers of GISCs.

* * *

3. Analysis and Findings: Profile of GISCs

The profile was collected with the objective to gain understanding in the various agricultural aspects of the sustainable cultivators. Structured questions were designed giving due consideration for ease of answering by the cultivators. The main areas of profiling were as follows:

- Inputs with respect to implements/machines,
- Fertilization and pest control inputs (organic, inorganic or combination of both)
- Crops cultivated, cropping area and yield levels achieved
- Gestation period required to reach a satisfactory yield levels through sustainable cultivation practices.

The individual profile data of a particular sustainable cultivator will help the user of the data to gain background information on the sustainable cultivator. The profile data will also help the user in identifying the particular sustainable cultivator of his/her interest. The findings on various aspects of profile are presented in following paragraphs in a summarized form for all the cultivators. It is aimed at presenting overall profile of all the sustainable cultivators. Profile of individual cultivators is not presented here to maintain the simplicity of the report.

3.1. Agricultural Implements and Tools Used

- Simple indicators like use of tractor, bullock cart, water pump etc. were used to assess the intensity of mechanization resorted by the sustainable cultivators. The percentage users of some of the implements are presented in Table 3.

Table 3. Tools and Implements Used by Sustainable Cultivators

Type of Tools and Implements*	Yes	No	No Response	Total
Tractor	19%	75%	5%	100%
Bullock Cart	72%	23%	5%	100%
Water Pump	81%	14%	5%	100%
Drip	25%	42%	37%	100%
Jerry cans	18%	77%	5%	100%
Chaff Cutter	21%	74%	5%	100%

* Note: The respondents were given choice to select more than one option in case they are using more than one of the tools/implements listed. Such cases have not been separately presented here to maintain the ease of interpretation.

- The above table suggests that the sustainable cultivators are well equipped with the basic tools and machinery necessary for the agronomic operations. Majority of the cultivators make use of bullock cart (72%) and water pump (81%), which clearly indicates towards self-sufficiency with respect to bullock power and energy

requirement for irrigation. This shows that the cultivators certainly do not represent the resource poor marginalized or disadvantaged sections of the society.

- However, the machinery and equipment resources used by these cultivators are still much below than those prevalent in the modern mechanized agriculture operations. This is clearly indicated by the fact that just 20 % of cultivators make use of tractors or that just 25 % of the cultivators have resorted to drip irrigation.
- Hence, majority of the sustainable cultivators can be considered as medium farmers with moderate use of machines, tools and equipments.

3.2. Soil Tillage Operations

- Tillage is the physical manipulation of the soil with tools and implements to create favorable conditions for crop growth. Minimum disturbance of soil is one of the important guiding principles in sustainable agriculture. Zero tillage is the extreme limit of this non-disturbance principle whereas use of deep plough using tractor is the extreme limit of soil disturbance. Hence, question posed on tillage operation practiced by the sustainable cultivators was meant to assess the level of disturbance of soil.
- The percentages of cultivators resorting to various tillage operations are summarized in Table 4.

Table 4. Tillage Operations followed by Sustainable Cultivators

Tillage Operations*	Yes	No	No Response	Total
Bullock-driven ploughing	75%	19%	5%	100%
Tractor-powered ploughing	30%	65%	5%	100%
Hand Hoeing	23%	72%	5%	100%
Scrapping the Soil by hands	11%	84%	5%	100%
Zero Tillage	12%	82%	5%	100%

Note: The respondents were given choice to select more than one option in case they are using combination of more than one of the tillage operations listed above. Such cases have not been separately presented here to maintain the ease of interpretation.

- As seen in the above table, 75% of sustainable cultivators have reported to be practicing bullock-driven ploughing and 30% of the cultivators resort to tractor-powered ploughing. This suggests that ploughing of soil is seen as necessary operation by majority of the cultivators. Thus, zero tillage, which forms an important practice as per some of the proponents of natural farming (especially Masanabu Fukuoka), is not considered as favourable option by majority of these sustainable cultivators.
- Tractor powered ploughing leads deeper tillage in the soil as compared to bullock-powered ploughing. Hence, the soil disturbance caused by use of tractor is much higher than that caused by bullock driven plough. The figures from the above table shows that number of cultivators resorting to bullock ploughing is more than double the cultivators who are using tractors. This fact suggests that the sustainable cultivators still rely more on the shallow ploughing through bullock driven plough and thus maintain the soil disturbance to a moderate levels. Incorporation of cattle in the farm system in the form of the bullock driven plough also enhances the

complexity of the system by enabling recycling of crop residue in form of animal manure and animal power.

- Zero tillage is practiced by only 12% of cultivators. This figure is small, however it does point towards the feasibility of such a practice and can be further investigated for its potential.
- Scrapping of soil by hand and hand hoeing are again practices, which reduce the disturbance caused in the soil to a minimum. Being labour intensive these operations are seemed to be less favourable. Hand hoeing is reported by 23 % of the sustainable cultivators, which indicates towards the still prevalent importance of hand-tools in sustainable cultivation.

•

3.3. Cultivation Seasons

- The number of seasons for which crops are cultivated gives the idea about the intensity of cropping and the subsequent burden on the soil being cultivated. It also provides direct evidence on the period of availability of irrigation.
- The break-up of the percentage of cultivators according to the seasons during which they cultivate their land are summarized in the following Table 5.

Table 5. Cropping Seasons of Sustainable Cultivators

Cropping Season	Yes	No	No Response	Total
Rainy Season	95%	0%	5%	100%
Winter Season	91%	4%	5%	100%
Summer Season	63%	32%	5%	100%

- Almost all the respondents cultivate their soil in rainy and winter season.
- Large number of these cultivators (63%) cultivate even in the summer season. Thus, the cropping intensity of majority of the cultivators is high. Cultivation in non-rainy season especially summer season indicates that majority of the have access to irrigation.

3.4. Number of Years Engaged in Sustainable Cultivation

- Many aspects of sustainable cultivation bears strong relationship with the time period (temporal aspects) or duration for which the sustainable cultivation practices are being followed. Many factors like diversity, sustainability etc. increases over a period of time. Thus knowing the duration for which the cultivator is engaged in sustainable cultivation is important background information. This background information will be helpful in gauging the experience of the particular sustainable cultivator.
- The time duration for which various respondents are engaged in sustainable cultivation is summarized in Table 6.

Table 6. Duration of Engagement in Sustainable Cultivation (years)

Duration (years)	Percentage Cultivators
1 to 3	9%
4 to 9	30%
10 to 15	32%
16 & above	16%
Total Response	86%
No Response	14%

- As seen in the above table majority of the cultivators are engaged in sustainable cultivation for more than three years. Hence, they are not new entrants in the field of sustainable cultivation.
- About 48% of the cultivators are doing sustainable cultivation for more than 10 years now. These are certainly breed of cultivators who must have gathered considerable knowledge of sustainable cultivation.

3.5. Gestation Period

- Gestation period was defined, as the period required for achieving satisfactory yield levels* through sustainable cultivation practices. This information is critical considering the inability of the marginalized or disadvantaged sections of farmers to wait for a longer gestation period. This information can also be used to assess the period for which the marginalized sections would require support for continuing the sustainable cultivation practices.

* Due to limitation of indirect survey the satisfactory yield levels considered here for gestation period could not be defined at this stage.

- The gestation periods reported by the cultivators have been summarized in the following ranges shown in the Table 7., given below.

Table 7. Gestation Period to Achieve Satisfactory Yield

Gestation Period	Percentage Cultivators
0-1 years	7%
2-5 years	44%
6-10 years	16%
11-15 years	5%
Total Response	72%
No Response	28%

- From the above table it is seen that majority of the sustainable cultivators have reported the gestation period to fall within 2 to 5 years. Thus, this can be considered as the minimum period to reach a level of satisfactory yield. There are many factors like the intensity of inputs (e.g. fertilizer), cropping system etc. that will determine

the gestation period in sustainable cultivation. The above chart does not consider all these factors, however this can be used as an overall indicator of gestation period.

- The mode of the gestation periods reported by the respondents comes to be 3 years. Almost 24% of the 72% respondents have stated 3 years as the gestation period required by them to reach a satisfactory level of productivity from sustainable cultivation.
- Thus the range of 2 to 5 years (depending on the cropping system, prior conditions and other factors) can be considered as the required period for which the marginalized sections would require support for continuing the sustainable cultivation practices.

3.6. Land Area Under Sustainable Cultivation

- The land holdings especially the land put under sustainable cultivation gives an idea of the intensity of management and operations involved under various practices of sustainable cultivation.
- The total land put under sustainable cultivation by the respondents has been summarized in Table 8.

Table 8. Land Area Under Sustainable Cultivation (per cultivator)

Total Area Under Sustainable Cultivation (hectare)	Percentage Cultivators
Up to 2	26%
2 to 4	18%
4 to 8	11%
8 to 12	7%
12 to 20	9%
20 and above	14%
Total Response	84%
No Response	16%

- The above table shows that majority of the respondents (44%) are practicing sustainable cultivation on less than 4 hectare while almost 26% of the responding cultivators practice sustainable cultivation on less than 2 hectare of land.
- The small and marginalized farmers have a similar pattern of land holdings as the majority of these sustainable cultivators. This indicates towards the relevance of the methods and techniques followed by these sustainable cultivators to the conditions faced by the MVS.

3.7. Organic and Inorganic Inputs

- Sustainable cultivation is popularly associated with organic agriculture in which no artificially synthesized fertilizers or pesticides are used. Use of purely organic inputs puts severe challenges on soil management especially on satisfying nutrient

requirements of the crops and also on control of the crop pests. Thus the information about the type of inputs (organic or inorganic) going into the soil and pest control is vital to gauge the type of sustainable cultivation practices being followed.

- Non-use of inorganic inputs also reduces the cost of cultivation considerably. This is especially important from the point of view of the resource poor and marginalized sections of the cultivators.
- The percentage of cultivators and the type of inputs (organic or inorganic) used by them for soil and nutrient management have been summarized in following table:

Table 9. Type of Soil Inputs (Organic vs. Inorganic)

Soil Inputs (Organic Vs. Inorganic)	Percentage Cultivators
Only Organic	75%
Combination of Organic & Inorganic	19%
Only Inorganic (Chemical Fertilizers)	0%
Total Response	95%
No Response	5%

- The percentage of cultivators and the type of inputs (organic or inorganic) used by them for pest control have been summarized in following table:

Table 10. Type of Pest Control Inputs (Organic vs. Inorganic)

Pest Control Inputs (Organic Vs. Inorganic)	Percentage Cultivators
Only Organic	70%
Combination of Organic & Inorganic	21%
Only Inorganic (Chemical Pesticides)	4%
Total Response	95%
No Response	5%

- Both the above tables indicate that majority of these cultivators are dependent solely on organic inputs. Thus the soil and pest management practices followed by them have greater importance and relevance for sustainable agriculture as a whole.
- The other important feature of the above data is that about 20% of the cultivators still resort to judicious combination of both organic and inorganic. The practices followed by these cultivators are also relevant in designing and planning of transition phase for moving towards (organic input based) sustainable cultivation.

3.8. Crop Yields Achieved

- Cost-benefit ratios on various terms like monetary inputs, external inputs, biomass inputs etc. can serve as important evaluation criteria for the achievements of the sustainable cultivators. This could not be pursued due to the limitation of the scope of

the existing study. However, crop yields reported by the sustainable cultivators can be used to understand the yield potentials achieved by the cultivators according to the type of inputs used by them.

- In Annexure V. A., a table has been presented that lists the figures of the maximum of the reported yield values reported by the various respondents for particular crops. In this table only those crops have been included, the yield values for which have been reported by at least three respondents. The yield values for other crops where the number of respondents reporting for these crops are very less have been presented separately in Annexure V. B.

* * *

4. Analysis and Findings: Practices followed by GISCs

4.1. Investigation Levels

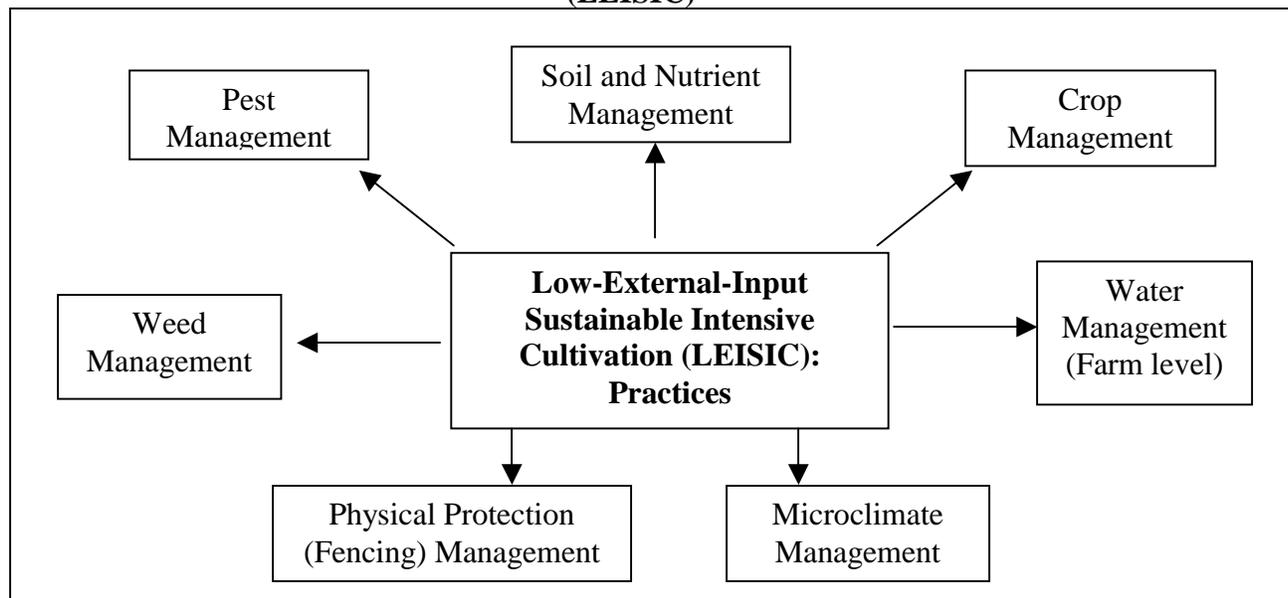
Documentation of the practices was done through interviews and field visits. The level of detailing of the documentation varied as per the levels of investigation. Sometimes it was possible to investigate the sustainable cultivation practices followed by the cultivator in great details whereas in other cases the level of detailing was very low. The following were the levels of investigations that lead to different levels of detailing:

- Interview (verbal communication): During the interview the minimum possible detailing level was achieved. At this level only the type of practices followed by the cultivator could be identify.
- Actual field observations: Field observations allowed detailing of the identified practices with respect to the processes and parameters.
- Technique Chart: Technique chart designed for documentation was the highest level of detailing envisaged for practices documentation. It included every possible detail of the process, parameters, results achieved etc. Reaching this level of detailing in the documentation was rather a tough task. Only partial success was achieved in reaching this level of detailing. This level of detailing can be considered only at the future possible stage of the documentation process.

4.2. Framework for Documenting Practices

- For last three years ReLi Group has been experimenting and developing a demonstration plot of small plot cultivation (done through another project) using sustainable practices. This field experience and rigorous documentation done during the field work lead to evolution of 'Low External Input Sustainable Intensive Cultivation' (LEISIC) as an appropriate conceptual base while working on small plot cultivation especially for livelihoods support of most vulnerable sections of society (MVS). The technical aspects of LEISIC were seen to be falling into seven broad areas. These were identified as the major practices in sustainable cultivation. These seven practices are presented in Diagram 1.

Diagram 1. Practices of Low-External-Input Sustainable Intensive Cultivation (LEISIC)



- The documentation of practices followed by the GISCs is done based on the above seven practices.
- These practices were further broken into methods and methods were further broken into techniques. This classification is done to systematize and organize the knowledge base existing with the GISCs. The primary objective is to document the practices followed by the GISCs at various levels of detailing. It will provide a framework for entering the information and data gathered by the GISCs at appropriate place and then allow easy and accurate retrieval of the required information. This will facilitate knowledge building and sharing by the GISCs themselves.
- The different heads for documenting technique level information were captured in the form of ‘Technique Chart’ (Please refer the Annexure VIII. E.)
- The method level breakup and beyond has been evolved based on the information gathered from the GISCs during the field visits and interviews. Attempt has been made to stick to the standard classification (existing in the scientific literature) as far as possible.
- Keeping in view the constraints of space, only introduction to the classification level information of the practices has been included in this report. The details of the methods and techniques have not been included in the report. A separate document on ‘Practices in Sustainable Cultivation’ can be prepared to incorporate the detail information on the methods and techniques.
- A table that relates the particular technique with the practitioners of the technique has also been included in this report. This will help the grassroots workers and other cultivators to approach the particular practitioner for more information on the technique of his/her interest.

- The practices documentation is processed using computerized database management system that provides flexibility in storage, retrieval and entering new information for updating.

4.3. Practices-Methods-Techniques (P-M-T) in Sustainable Cultivation: Classification derived from Survey

- The different methods falling under the seven practices (as mentioned above) that have been identified during the survey are listed in the annexure (Please refer Annexure II. Practices and Methods in Sustainable Cultivation) along with a short description. The seven practices comprises of 31 different methods in sustainable cultivation being followed by the surveyed cultivators.
- In another annexure (Please refer Annexure III. Methods and Techniques in Sustainable Cultivation) techniques falling under each of the 31 methods have been listed with short description of the particular technique. During the survey 87 different techniques were identified under the various methods of sustainable cultivation.

4.4. Practitioners of the Practices-Methods-Techniques of Sustainable Cultivation

- The P-M-T followed by particular survey respondents (practitioners) have been listed in the annexure (Please refer Annexure IV. Sustainable Cultivation Practitioners and their Techniques) along with short description of specifics of the techniques followed by the particular practitioners. This will be helpful to identify practitioners involved in specific methods and techniques and thus facilitate knowledge sharing.
- The data of the practitioners and the techniques followed by these practitioners will also enable the grass-roots workers to identify the most popular techniques among the many listed in the data.
- The data comprises of 216 specific practitioner's techniques falling under 87 general techniques in sustainable cultivation.

* * *

5. Lessons in Adoption of Sustainable Practices

The survey not only provided understanding in the area of methods and techniques of sustainable cultivation practices but it also provided insights into the broader process or movement of sustainable agriculture that is in progress in different regions of Maharashtra. An attempt has been made here to present these lessons and observations that may be useful in designing strategies for development of sustainable agriculture as livelihoods support activity for the most vulnerable sections of the society (MVS).

5.1. Different Actors in the Sustainable Agriculture Movement / Process

The actors identified during the survey in the sustainable agriculture movement can be categorized into: Individuals, Informal Groups, NGOs, Regional Networks, Government Organizations and Private Organizations. Observation for each of the roles has been described below.

- (i) **Individuals:** There are three main actors working for sustainable agriculture in individual capacity viz. Primary Influencers, Practitioners and Campaigners. Primary influencers can be considered as those who are the initiators and key promoters of the alternative agriculture practices at international, national or regional levels. E.g. Masanabu Fukuoka has been a primary influencer at international level while S.A. Dhabholkar was a primary influencer at regional level. Such individuals become the core thinkers, innovators and promoters of sustainable agriculture. They can be considered as pioneers at their level of influence. Practitioners are all those individuals who are following sustainable agriculture methods and techniques in their farms. These may be full-time farmers, part-time farmers, experimenters and innovators working in individual capacity. Role models emerge only from these practitioners because they are ones who are successful in adapting the techniques to actual ground reality. Campaigners are the individuals who take the role of promotion of sustainable agriculture through public appearances, publications and other media tools.
- (ii) **Informal Groups:** The practitioners of sustainable agriculture of a particular locality come together in form of informal groups. Sharing of experiences, procurement of inputs, market establishments and solving other problems are the major reasons for such group formations. These groups may later turn into a formal group (in the form of 'Sheti Mandal') or eventually register as Non-Governmental Organization (NGO).
- (iii) **NGOs:** Registered organizations in the form of NGOs are taking various roles in the process like research and technology development (e.g. organizations like 'Dharamitra' and 'Chetna Vikas'), large-scale extension (e.g. organizations like AFARM, YUVA) or market-based interventions (e.g. organizations like 'Vidarbha Organic Farmers Association'). NGOs initiated by local people have a vital role in the extension activities.
- (iv) **Regional Networks:** Networks of various organizations at regional level (e.g. *Uttar Maharashtra Lok Vikas Manch* and others) are playing important role in bringing

consensus and solidarity on various issues of sustainable agriculture among the local groups.

- (v) **Government Organizations:** Government Agriculture Department especially the Maharashtra State Department has also started promoting sustainable agriculture. A government scheme based on vermi-composting is receiving widespread acceptance. It has provided great impetus to widespread use of vermi-composting among the sustainable cultivators. But there still lacks sound policy on promoting sustainable agriculture especially for ensuring food security among the MVS.
- (vi) **Private Organizations:** Private enterprises and companies have entered the field of sustainable agriculture with various organic products like organic fertilizers, pesticides etc. Services linked to marketing of organic produce like registration for organic farmers have also been initiated by private organizations. Ion Exchange is one of the major players, which not only produces organic food at their own chain of production farms spread across various regions but also have started providing market related services

5.2. Adoption Process

The ways in which the farmers are adopting the sustainable agriculture practices is one the important area of lessons from the survey. This can be seen in three different categories: Ecology and Economic Situation Driven Process, Market Driven Process, People Driven Process and Individual Process.

In the first category the need for adopting sustainable agriculture practices arises out of the ecological and economic constraints posed by adverse impacts of high external inputs in the agricultural practices. The process of adoption of sustainable agriculture in such situations can be seen as sequence of events given below (these events represent the situation of some of the regions, especially the cash crop cultivating regions, surveyed during the study):

- (i) **Promotion and Use of High External Inputs:** Widespread and excessive use of artificially synthesized fertilizers, pesticides and deep tillage operations resulting into record yield achieved by the farmers. Sudden rise in land under large-scale monocultures of commercial crops.
- (ii) **Loss of Primary Productivity:** High chemical inputs in soil results into faster decomposition of organic matter and loss of microorganisms. This continues over a long period resulting to reduction in both the organic carbon in soil and the microbial activity in the soil. Hence inherent capacity of the soil to maintain and enhance the fertility and nutrient levels is lost. Dependence on artificially synthesized fertilizers increases with higher and higher amount to be applied to overcome the loss of primary productivity. All this leads to complete reliance on fertilizers with its ever-increasing cost. Eventually the cost increases beyond the benefits accrued.
- (iii) **Buildup of pesticide resistance:** Large-scale monocultures lead to heavy pest infestation. Excessive amounts of pesticides are used to control the pests. Few individuals among the pests become resilient to the pesticides and multiply. Need for newer and more toxic pesticides arise. The cycle continues with the effect that the

cost of pesticide application mounts to unacceptable limits. Again the benefits start falling short of the cost.

- (iv) Non-repayment of loans: The higher yields due to high external inputs in the initial period allures the farmers to invest money by borrowing from Banks and private lenders. Later the reduction in productivity induced due to the adverse impacts described above leads to heavy losses and hence non-repayment of loans. Some cultivators unable to handle the ecological and economic crisis ultimately resort to suicide.
- (v) Need for low cost practices: Reduction in the input cost of agricultural practices is seen as the only option to overcome the crisis. Sustainable agriculture practices with low cost organic based inputs are found as a feasible option to artificially synthesized fertilizers and pesticides. Reduction in chemical inputs and increase in organic inputs leads to slow but gradually increasing levels of microbial activity in the soil. The yield levels also follow the same trend. As the cost reduces and the yield levels start increasing from an initial low level, the benefits start increasing over and above the cost. The yield levels achieved henceforth may be optimum for given situations but may not reach the high record levels achieved during the era of excessive use of external inputs.

As the soil regains its lost natural fertility and the yield levels stagnate at some optimum level, there is a possibility that people may be allured back to the use of chemically synthesized fertilizer and pesticides by the attraction of gaining higher and higher yields. In this way the process driven by the ecology and economic situation may continue in the form of cycle of long durations ranging from 20 to 30 years. To avoid this vicious cycles the immediate need is to provide policy support for promotion of sustainable cultivation. In the long term there is a need to focus on facilitating the process of enhancing the cultivators' knowledge of the various process in their farm and their interrelationships with each other. This approach asks for looking at agricultural process from the point of view of ecology. The research (especially the on-farm research and the research initiated by grassroots cultivators) and extension activities should be based on understanding and making use of these interrelationships in the ecological processes like nutrient cycles, pest occurrences and so on. The focus of the extension should be to make the cultivators capable of understanding these processes and analyze the options open for him so as to take appropriate decisions.

In the market driven process the establishment of market for organic food leads to adoption of some of the sustainable practices. This can be seen in cases of agricultural produce like banana, cotton, chilli etc. Banana produced by organic inputs has a well-established market due to its use as an input in baby food preparation. This was clearly observed in the banana-growing belt of Northern Maharashtra. Organic chilli and other food items that are used in pickles are also have a market. Thus the potential of organic food getting a premium price in the market drives many cultivators towards sustainable practices.

The ecology and economic situation driven process mentioned in the earlier paragraph may be further facilitated by the second category of adoption process (called 'People Driven Process') in which the main actors are people playing different roles in

the move towards sustainable agriculture. In this process the Primary influencers (as mentioned in earlier section) provide a ray of hope to those who are in search of alternative practices. Such informed cultivators then adopt the practices, modify the same and learn from their own experiences. The pool of traditional practices of the locality also becomes a big source of information in the search for alternatives. These cultivators become pioneers at local level. The experience of these pioneers prompts the other people to follow the practices being adapted and improved by the pioneers. These are mainly people who are in a position to take a risk in shifting over to sustainable cultivation practices. These early initiators are followed by the late initiators depending on the success of the early initiators. NGOs and individual campaigners facilitate the process of up-scaling the success of pioneers and early initiators. The marginalized farmers and the MVS are not capable for taking the risk of changing the prevalent practices mainly due to lack of reserves for support in case of losses. But an important observation during the survey was that the adoption of sustainable practices by the nearby large farmers gives great impetus to the smaller and marginalized farmers to initiate the adoption process though cautiously. The big farmer in particular locality who shifts over to sustainable practices gives indirect legitimacy and conformation of utility of sustainable practices. Thus the adoption process involves number of actors and situations leading to an organic process of complex actors and situations that builds on each other's outcomes.

The process at the individual level begins once the cultivator is convinced on the need to move towards sustainable cultivation practices (this is achieved through above mentioned processes). There were two specific strategies at the farm level identified during the survey viz. Trial Plot and Combination of Practices. Trial plots are small size plots (compared to actual land holding) identified by the cultivators for applying the various methods and techniques of sustainable cultivation. The cultivator continues the prevalent practices on the remaining land area. In this way the cultivator experiments on small scale at his farm. The other ways in which the cultivator initiates the adoption of sustainable practices is by making a combination of prevalent practices and sustainable practices in such a way that the risk factors of loss of yield are avoided. E.g. the cultivator may start using organic manures but at the same time continue chemical fertilizers but at lower rate of application or he may rely completely on organic manures but may continue to resort to chemical pesticides for pest control. In both the strategies of the cultivator the important requirement is that the cultivator has reached a conviction level to shift to sustainable practices and that he learns and improves based on the experience from small-scale initiative undertaken by him.

5.3. Adoption Enhancing Factors

In the process of survey many external factors that facilitated the process of adoption of sustainable practices were identified. Such factors have been listed below which summarize the points covered in the discussion on adoption process:

- **Ecological Constraints:** This represents the productivity constraints posed by the adverse ecological conditions faced by the agricultural land.
- **Economic Constraints:** This represent the heavy input costs, reducing benefits, and burden of debts faced by the cultivators.

- **Market Availability:** This is found to be one of the most important factors that lead to widespread adoption of sustainable practices especially in the case where forward linkages of the market are well established. E.g. Organic cotton sold in export market earns a premium price.
- **Government Incentives:** Government initiatives especially seen in case of subsidy for vermiculture has been beneficial in enhancing the adoption of vermin-composting as one of the sustainable agriculture technique.

* * *

6. Overall Lessons and Conclusions

6.1. Conclusion and Lessons based on Practices Documentation

- There are wide number of methods and techniques of sustainable cultivation with variations in the processes and parameters being practiced at the grassroots levels. In the present study 216 specific practitioners' techniques that are classified under 87 general techniques and 31 methods were identified. The potential of documentation of the grass-roots practices is evident. There is a potential for not only more in-depth investigations into the details of these practices but also to cover more (especially interior) regions for documentation of practices followed by people not covered in the present study.
- The future documentation efforts should be participative so that detailing of the practices as well the reach of the documentation can be increased. Capability building of the community can be integrated with the participative documentation process, which will help in disseminating the importance on the need for documenting the practices, methodology and utility of the documentation.
- Biodiversity seem to be a neglected area in the present agricultural practices. Hence there is a need to integrate biodiversity into the farm system with the objective to cater to the diverse livelihoods needs of the particular community.
- Integration of forestry especially the perennials (long duration plants) in the agriculture systems is still not seen as widespread approach towards sustainable agriculture. Considering the seasonality of rainfall and thus the limited growth period available for plants, there is an urgent need to make perennial plants as part of the sustainable cultivation practices.
- During the survey it was observed that sustainable agriculture is generally linked with use or non-use of organic input for fertilization and pest control. This puts a limitation on the acceptance of sustainability as a much wider concept. Efforts are needed to emphasis on the other factors of sustainability like reduction in the dependence on external inputs and hence the market and also on farm level energy efficiency. Special efforts should be taken to emphasize on the broader concept of sustainability rather than just associating it with organic agriculture.

6.2. Conclusions and Lessons with emphasis on relevance to MVS

- ◆ There are wide array of grassroots initiatives in sustainable cultivations, which have potential for adoption and wide-scale replication. This is especially important for developing the sustainable cultivation practices as a part of livelihoods activity for the MVS. This potential can be tapped for ensuring sustainable livelihood of the MVS.
- ◆ The information collected during the survey especially about the Practices-Methods-Techniques of sustainable cultivation does provide a valuable content for the grassroots workers engaged in ensuring livelihoods security of MVS. However, there remains certain practice like fencing development, weed and pest control that needs further

development. More in-depth investigations into the practices documented in the present report will provide more details at the technique level.

- ◆ The adoption processes in different situations need to be understood before embarking on sustainable livelihoods programs based on sustainable cultivation. There is a need to devise transition strategies for moving towards sustainable agriculture. Technical, financial and training support should be part of the program to reach to the MVS. This is particularly true in the light of low risk absorption capacity of the MVS and hence requires support during the gestation period of sustainable agriculture.
- ◆ In extension process the emphasis should be given on developing capabilities of the people to enable them to take decisions based on sound understanding and analysis. For example the focus of bringing sustainability in agriculture should not just be linked to the use of organic fertilizers and pesticides. Instead areas like biodiversity, energy efficiency, reduced external inputs etc. should also be integrated in the concept of sustainability with equal importance.
- ◆ There is a need to integrate biodiversity as a major component in sustainable cultivation, which is missing in the present scenario. The objective should be to develop complex agriculture systems, which can cater to diversity of livelihood needs like food, fodder, fuel, medicines etc. This is especially important in case of the MVS as their integration with the cash economy or the market in premature stage (i.e. without cushions like reserves) will increase their vulnerability.

6.3. Future Possibilities

The major outcomes of the survey have been the methodology of documentation of grassroots practices and also the set of practices, methods and techniques of sustainable cultivation collected during the field visits. These outcomes hint towards the probable areas for future development. Some of the possibilities for future activities have been listed below:

- Participative documentation of grassroots practices is a potentially demanding area as it can lead to a new approach to development and adoption of sustainable practices in natural resources based livelihoods. The process of participative documentation can also be seen as an effective medium of education, which will be especially important for the most vulnerable sections (MVS) of the society who have low levels of formal education.
- The process of documentation of practices can be further extended to other areas of livelihoods of the MVS that are dependent on natural resources like forestry, fishing etc.
- The documentation of practices has been processed using computerized database system. Hence it provides flexibility in adding more content and in replicating the same system for other areas of documentation. The further development of this database system into a package for documentation of grassroots practices in sustainable cultivation is one of the possibilities for future work.

- The database system can be further integrated with web-based systems so that more number of people can be reached through the World Wide Web. This has a potential to turn into a cost-effective tool of building and sharing of grassroots knowledge.

* * *

Annexure I. Definitions and Explanation of Important Terms used in the Survey

1. Grassroots Initiatives in Sustainable Cultivation (GISC)

Sustainable Cultivation is any activity or process that involves sustainable (for definition of sustainability please refer the definition of LEISIC) ways of growing of crops necessary for various livelihoods needs (like food, fodder, fuel, medicine etc.) and allied activities e.g. growing of biomass that is incorporated in food crop cultivation in the form of green manuring. *Grassroots initiatives* involve any form of activity, action or intervention that is grounded with actual field experience.

Thus the grassroots initiative in sustainable cultivation may take the form of the livelihood activity carried by sustainable cultivators or a research and extension activity undertaken by social organisations. These initiatives are collectively referred to as GISCs.

“GISC can be defined as an activity, action or intervention grounded with actual field experience in the process involving growing of crops necessary for various livelihoods needs (like food, fodder, fuel, medicine etc.) and allied activities e.g. growing of biomass that is incorporated in food crop cultivation in the form of green manuring.”

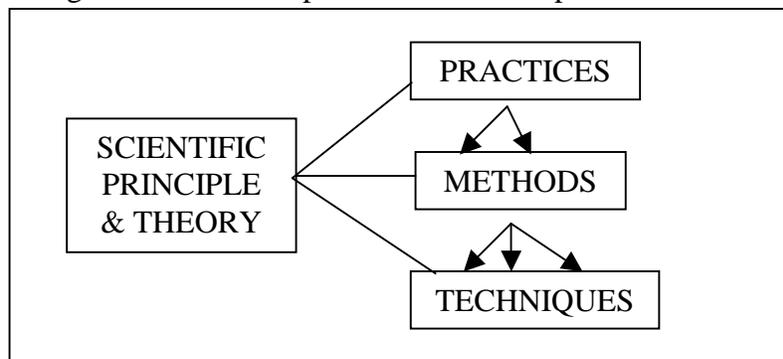
2. Practices, Methods and Techniques (P-M-T) of Sustainable Cultivation

Practices (P) of sustainable cultivation are the broad areas, aspects or fields of actual working (or management) on the farm that are practiced in sustainable cultivation. E.g. Soil and Nutrient Management, Pest Management, Micro-climate Management etc. are some of the aspects that have are put into practice while working towards sustainable cultivation.

Methods (M) are the different ways of performing the practices. Thus methods give different options, which can be combined into a set of methods to be adopted for particular socio-economic and ecological conditions such that the objectives of above mentioned practices are fulfilled.

Techniques (T) are a complete set of specifications to be used while implementing any particular method in field conditions. Though the methods may be same for different regions, the techniques with its set of specifications may differ according to the socio-economic and ecological conditions of that particular region.

Thus it can be seen that here P-M-T follows a hierarchic pattern in which practices are at the top leading to various methods of the particular practice and techniques forming the exact set of specifications of the particular method.



For Example:

Practice	Soil and Nutrient Management
Methods	Composting, Plant Biomass based Manuring, Nutrient Supplement etc.
Technique	Heap Composting Technique, Vermi-composting Technique etc. including the specifications of the technique like process involved, inputs required, expected output etc.

3. Low External Input Sustainable Intensive Cultivation (LEISIC)

Cultivation of food and non-food crops (as mentioned in the definition of sustainable cultivation) essential to satisfy diverse livelihoods needs through the practices, methods, techniques that follow the below mentioned criteria of LEISIC:

Criteria for LEISIC

Modified and adopted from 'Criteria for LEISA' proposed by the Center for Research and Information on Low External Input and Sustainable Agriculture (ILEIA, Netherlands)

Criteria for the principle of social justness (including gender sensitivity and cultural respectfulness)	Criteria for the principle of economic viability	Criteria for the principle of ecological soundness
<ol style="list-style-type: none"> 1. Potential towards adoption by the resource-poor and women representing the most vulnerable sections of the society. 2. Possible to both men and women. 3. Increased food and nutrition security for all members of the family. 4. User-control over production, consumption, marketing i.e. reduced dependency on external institutions (input, credit, marketing) and the related risk. 5. Connection to indigenous knowledge and cultural beliefs. 6. Generation of employment/self-employment 7. Able to build capability of taking appropriate (farm related) decision on sound understanding and analysis. 	<ol style="list-style-type: none"> 1. Potential for livelihoods support for marginalized sections of society 2. Sustained farmer livelihood: also in economic terms. 3. Competitiveness: of farm households in local, national and international context. 4. Efficient use of production factors: natural, labor, knowledge and capital. 5. Low relative value of external inputs: minimize cost of external inputs in comparison to cost of total inputs and to value of total output. 	<ol style="list-style-type: none"> 1. Enhance Biodiversity: to cater to diverse livelihoods needs like food, fodder, fuel, medicine etc. 2. Balanced Nutrients Flows: Balanced input and output and its optimum availability by maximum recycling of organic matter and minimal and efficient use of external inputs. 3. Efficient water use: maximum output per unit of water used. 4. Diversity of Genetic resources: Animals, Plants, Soil Life and pest-predators to maximize ecological resilience. 5. Efficient energy use: maximum use of renewable energy source, maximum output per unit of energy used. 6. Minimal negative environmental effects: by over-exploitation and pollution of soil, water and air causing harm to human and animal well-being. 7. Minimal use of external inputs: efficient use of locally available resources.

Annexure II. Practices and Methods in Sustainable Cultivation: Classification based on Survey Data

Practice: Weed Management	
Methods	Description
Recycling Weeds	Various techniques through which the weeds are effectively made used for manuring through either weeding, mowing etc. and then recycling back to the soil as a manure are broadly termed here as Recycling Weeds
Sowing Time Management	The method of adjusting the time of sowing/ planting in such a way that the crop establishes earlier than the weed and hence overshadows the weed is considered here.
Weedicides	Some simple weedicde preparation tried by a respondent cultivator have been included here.

Practice: Water Management	
Methods	Description
Building Cost-effective Storage Structures	Techniques of installation/construction of various low cost water storage structures used for irrigating crops are grouped under the technique of building cost-effective storage structures.
Mulching	Covering the soil around the crops to reduce the soil moisture loss due to evaporation are included in Mulching.
Soil Moisture Monitoring	Simple farm level techniques to measure and monitor the root-zone moisture levels that can be useful in efficient management of irrigation water are termed as Soil Moisture Monitoring Methods.
Watering Close to Root-tips	Various techniques of application of water to the crops that enable effective use of irrigation water by watering close to the root-tips (which form the absorption region of the roots) is considered under the method of watering close to the root-tips.

Practice: Soil & Nutrient Management	
Methods	Description
Compost	The various techniques of turning plant and other organic matter into manure through decomposition process are included in composting. Hence degradation of biomass accelerated by Earthworms through the technique of vermicompost is also included in this method.
Plant Biomass Manuring	The techniques through which plant biomass (green or dry) is produced and reused as manure directly in the soil are included in the method of Plant Biomass Manuring.

Nutrient Supplement	Nutrient Supplement is a group of diverse techniques used to supplement especially the nutrient supply to the crops so as to satisfy the deficiencies of the nutrient faced by the crops even after manuring the soil with other methods.
Soil & Nutrient Conservation (farm level)	Various farm level techniques undertaken towards conservation of the soil and nutrients in and around the farm are considered under the heading of Soil and Nutrient Conservation.
Ex-situ Soil Addition	Bringing soil from outside (external) the farm environment and adding it to the farm is termed here as Ex-situ Soil Addition.
Tillage Operations	Operations involving physical manipulation of soil with tools and implements are included in Tillage Operations.

Practice: Pest Management	
Methods	Description
Collection and Destruction	Pests collected and destroyed through manual, mechanised or any other techniques are termed here as collection and destruction method of Pest Management.
Exploiting Host Resistance	Techniques that make use of the characters that enable plants to avoid, tolerate or recover from pest attacks are grouped under the method of exploiting host resistance.
Organic Pesticides	All the techniques under which various mixtures of organic materials are prepared for applying on crops with the objective of pest control are termed as organic pesticides.
Predator Propagation	Different ways in which propagation of predators of the pest is facilitated are considered under the techniques of Predator Propagation.
Traps	Various techniques of traps used to attract and collect/destroy pests are collectively classified under this method.
Multiple Cropping	The various techniques that make use of the multiple cropping (i.e. growing diversity of crops on same piece of land) especially to take benefit of pest control accruing from it are considered under multiple cropping.

Practice: Microclimate Management	
Methods	Description
Shade Development	Different planting techniques through which shade is developed in the distant vicinity of the crops to stabilise microclimate (i.e. favorable temperature, wind conditions etc.) around the crop are included in this method.

Practice: Fencing Management	
Methods	Description

Green Fencing	Various ways in which a live fence is developed by planting suitable plant species are included in Green Fencing.
Animal Deterrents	Techniques by which large and medium animals (like birds, wild boars etc.) are deterred from the farm and hence discouraged from visiting the farm are considered as Animal Deterrents.

Practice: Crop Management	
Methods	Description

Multiple Cropping	All combinations of crop species in which two or more crops are being cultivated on the same piece of land in one year are included in multiple cropping.
Seeds Management	This is a general classification in which all operations related to seeds are included.
Pruning-Grafting Techniques	The various pruning, grafting and climber arrangement techniques used for manipulation of growth especially in fruit trees and climbers are included here.
Sowing & Planting Operations	Various aspects of sowing or planting of crops have been included here separately.
Other	Techniques which do not fall under any of the above mentioned methods of Crop Management are grouped in this category.

Practice: Other Practices	
Methods	Description

Low Cost Construction Material	Techniques of making constructional material like roofing, walls, bricks etc. made of low cost (agro based) biomass are grouped under the heading of Low Cost Construction Material.
Low Cost Fuel Generation	The techniques of generating fuel from various types of (agro based) organic matter is considered under the method of low cost fuel generation.
Minor Forest Produce	Collection or harvesting of forest or agro forestry based produce are grouped under minor forest produce.
Unconventional Methods	Techniques used in agriculture that are uncommon and sometimes not validated scientifically have been included in unconventional methods.

Annexure III. Methods and Techniques in Sustainable Cultivation: Classification based on Survey Data

Weed Management

Method: Weedicides	
Technique	Description
Salt + Caustic Soda + Water	A solution comprising of salt, caustic soda, and water is prepared and spread over the weed infested area as a measure to kill the weeds.

Method: Sowing Time Management	
Technique	Description
Early Sowing	Early sowing of main crop is done so that the crop will grow ahead of the weed and hence weed will be suppressed.

Method: Recycling Weeds	
Technique	Description
Uprooting	The operations in which instead of pruning, the weeds are uprooted (by hand weeding) and then recycled back into the soil in form of manure are included here.
Trampling	Trampling the weeds after drying such that it creates a natural ground cover are included in this technique.
Limited Pruning	Various ways in which weeds are harvested by continuous pruning (instead of uprooting) and then recycled in form of manure back into the soil are included in the technique of Limited Pruning. Pruning is done in such a way that the weeds are not allowed to compete with the main crop.
Burying Weeds in Soil	The technique of burying the weeds in the soil by tillage operations is included under the technique of burying weeds in the soil.

Water Management

Method: Watering Close to Root-tips	
Technique	Description
Appropriate Placement of Irrigation Channels	The placement of irrigation channels in such a way that it enables provision of water close to the root-tip is termed here as appropriate placement of irrigation channels.

Method: Soil Moisture Monitoring	
Technique	Description
Plantation of Moisture Indicator Plants	The technique of planning (schedule, dose) for irrigation by using visual signs of water deficit shown by plants (like drooping, curling, rolling of leaves) is considered here as soil moisture monitoring.

Method: Mulching	
Technique	Description
Plant Biomass Mulch	Plant based organic matter used as mulch is considered as Plant Biomass Mulch.
Other (than plant biomass) Mulch	Material other than plant biomass used for mulching is grouped together under the heading of other mulch.

Method: Building Cost-effective Storage Structures	
Technique	Description
Fabricated Tanks	This is the technique of using low cost fabricated tanks for water storage and irrigating crops by gravity flow.

Soil & Nutrient Management

Method: Tillage Operations	
Technique	Description
Soil Piercing	Piercing the soil with sharp tool little away from the root zone (without damaging the roots) so as to create passages for aeration is termed here as technique of Soil Piercing
Medium Tillage	Tillage operations that involves shallow (5-6 cm) to medium (15-20 cm) depth of tillage are considered under the technique of medium tillage.

Method: Soil & Nutrient Conservation (farm level)	
Technique	Description
Upstream Forest Conservation	Conservation of forest upstream of the farm undertaken to ensure nutrient rich sedimentation during rainy season in the farm lying down stream of the forest is termed here as Upstream Forest Conservation.
Terracing	It involves building of embankment or ridge and steps like structure, across the land slope to check the soil erosion.
Contour Cultivation	This refers to operations related to cultivation of crops performed nearly on the contour of the area, applied across the land slope.
Bund Cultivation	Cultivation of plants including crops on bunds to stabilise the structures is termed as Bund Cultivation.

Method: Plant Biomass Manuring	
Technique	Description
Leaf-litter Manuring	Manuring of soil by direct application of easy to decompose plant matter especially dry leaves, is termed as Leaf-litter manuring.
Insitu Green Manuring	The various ways in which the green plant biomass is produced and utilised as manure on the same piece of land is termed as Insitu Green Manuring.
Exsitu Green Manuring	The techniques in which the green plant biomass is procured from outside the cultivated plot and used as manure in the cultivated plot is termed as Exsitu Green Manuring.

Method: Nutrient Supplement	
Technique	Description
Vermiwash Supplements	The liquid from the vermiculture tank called as Vermiwash that is supposed to contain the secretions of the body fluid of earthworms is considered here as Vermiwash supplement.
Plant Biomass Based Supplements	Plant biomass used for manuring by some survey respondents in form of extracts or solutions is treated seperately as plant biomass based supplements.
Oil Cake Supplements	Use of various oil cakes as manures, which are the byproducts of oil extraction from oil seeds, are considered here as oil cake supplements.
Chemical Fertilisers Based Supplements	The techniques through which judicious use of chemical fertilisers is attempted are considered here under chemical fertilisers based supplements.
Cattle Dung/Urine Based Supplements	Numerous combitions of cattle dung, urine and other organic matter that results into different preparations are collectively called as Cattle Dung/Urine based supplements.
Ash Supplements	Varoius techniques of ash applications in the soil are included in the technique of Ash Supplements.
Animal Meal Supplements (remains of dead animals)	Remains of dead animals conventionally called as animal meals (e.g. bone meal, horn meal, blood meal etc.) that are used as manures are termed here as Animal Meal Supplements.

Method: Ex-situ Soil Addition	
Technique	Description
Soil Under Ficus (Banyan) Trees	The technique of collecting and using soil that lies beneath large ficus trees is considered here.
Roadside Ex-situ Soil / Dust Addition	The technique of collecting soil/ dust especially from the sides of the road and adding it to the farm soil is considered here.

Ex-situ Soil Bed Preparation Building of soil substrate on highly eroded land by importing all the required soil from outside the farm is termed as Ex-situ Soil Bed Preparation.

Ex-situ Alluvial Soil Addition Sediments deposited from flowing water called alluvium that is collected and added in the farm soil is termed here as Ex-situ alluvial soil addition.

Method: Compost	
Technique	Description
Tank Vermicompost	A container or a tank with side-walls is used for vermicomposting to provide protection to Earthworms and contain them in limited space.
Tank Compost	In this technique the organic matter is filled in a tank with side-walls built specially for composting.
Pit Compost	In this technique the organic matter is laid in a pit below ground surface with a specific layering pattern and no introduction of exotic earthworms.
Open Vermicompost	Vermicomposting is done in open space without any side-walls. This removes the cost barrier faced by small cultivators in vermicomposting. Requires more monitoring and management as compared to Tank Vermicompost Technique.
Nadep Compost	This is a special type of Tank Compost in which the side-walls have ventilations for aeration required during composting. The technique has been named after the founder Mr. Narayanrao Devrao Pandharpande.
Insitu Mulch Compost	Organic matter spread over the cropping area for decomposition in the form of mulch is termed here as insitu mulch compost. Use of hard to decompose matter is also included in this technique. Hence it is different from the Leaf-litter manuring technique considered in the method of plant biomass manuring.
Insitu Heap Compost	Organic matter allowed to decompose and mineralised (utilised) on the same place (close to crop) is termed here as insitu composting. Insitu heap composting is a special case where organic matter is laid in irrigation channels or furrows in the form of small heaps.
Heap Compost	In this technique the organic matter is laid as a heap above ground surface with a specific layering pattern and no introduction of exotic earthworms.
Heap & Pit Compost	This technique refers to the laying of organic matter in such a way that part of the matter is laid in shallow pit (i.e. below ground surface) and part of it is laid above the ground surface, thus benefiting from advantages of both pit and heap techniques.

Farmyard Manure (Heap/Pit)	In this technique the organic matter comprising of mainly waste from farm and cattle-shed (like cow dung, fodder waste, urine, crop residue) are randomly laid either in a pit below ground surface or a heap above ground surface.
Waterhyacinth Compost	This is a special case composting being developed by a survey respondent in which the major organic input is the troublesome aquatic weed called Waterhyacinth.

Pest Management

Method: Traps	
Technique	Description
Sticky Trap	Sticky material applied on various traps in such a way that the pest get attached to the trap are considered as Sticky Trap.
Odour Trap	Odour that attracts pest is used here to trap the specific pests.
Light Trap	Use of light for attracting and trapping the insects during the night is termed as Light Trap.
Food Trap	A trap that uses food of the specific pests as an attractant for the pests are included in Food Traps.
Method: Predator Propagation	
Technique	Description
Medium Preparation	Preparation of medium which assists in enhancement of the population or culture of predators especially microorganisms is considered under medium preparation for predator propagation.
Attracting Predators	Various measures taken specially to attract pest predators are considered here.
Method: Organic Pesticides	
Technique	Description
Urine Based Pesticides	Organic pesticides which have cattle urine as one of the ingredients are considered as Urine based pesticides.
Sticker Application	Technique of mixing and applying sticky material along with organic pesticides so that the pesticide is retained (stick) on the plant parts for longer duration is considered as Sticker Application technique.
Plant Based (Botanical) Pesticides	Organic pesticides which are exclusively plant biomass based are classified as Botanical Pesticides.
Other Organic Material Based Pesticides	Pesticides prepared from various organic matter other than plant or urine are considered here.

Method: Multiple Cropping	
Technique	Description
Repellant Crops	Plantation of various plants/crops having capacity to repel the crops are included in form Repellant Crops.
Combination of Crop Varieties	Cultivation of different varieties of crops on the same piece of land primarily to achieve control over pest infestation is considered under the technique of combination of crop varieties.

Method: Exploiting Host Resistance	
Technique	Description
Selection of Pest-Resistant Variety	Preservation, production and use of local variety that have gathered resistance to the pest over a period of time have been considered as technique of selection of pest resistant variety.

Method: Collection and Destruction	
Technique	Description
Shaking Plants	Pest like caterpillars are collected from bushes and smaller crops by shaking the stem and branches of the plants so that the caterpillars fall down and are easily destroyed.
Aphid Clearing	Aphids present on the surface beneath the leaves are cleared through various mechanical means.

Microclimate Management

Method: Shade Development	
Technique	Description
Fast Growing Exotic + Slow Growing Indigenous	The various designs of planting of fast-growing species especially the exotic plant species combined with the slow growing indigenous plant species is considered under this technique. Transition from exotic species to indigenous species is planned in this technique.

Fencing Management

Method: Green Fencing	
Technique	Description
Thorny Green Fence	Developing a fence of thorny plants by using different plant species in different combinations are termed as thorny green fence.

Bamboo Green Fence Use of bamboo in various forms to develop green fence is considered as Bamboo Green Fence.

Method: Animal Deterrents	
Technique	Description
Making Available Water Non-potable	Availability of potable water attracts some of the animal pests in the farm. Thus, by making this water non-potable develops a disliking in these animals for visiting the farm.
Low Cost Wired Fencing	Techniques of laying low cost wiring around the cropping area to deter the animal pests is termed here as low cost wired fencing.
Creating Foul Odour	This is a technique of creating foul odour in the farm to discourage certain animal pests from visiting the farm.

Crop Management

Method: Sowing & Planting Operations	
Technique	Description
Sowing Time	Specific dates or 'thiti' used by the survey respondent to decide the exact sowing date to achieve favorable climatic conditions and growing period.
Sowing Beds of Diverse Shapes	Sowing beds are made of different shapes to make it easy for the women cultivators to carry various agronomic operations without the need to bend or take back-breaking position. e.g. 'U' shaped bed allows women cultivators to sit and conduct various operations on the bed.
Plant Propagation	Propagation of plants through various nursery techniques practiced using organic inputs are considered here under Plant Propagation.
Measured Planting Distance	This is the technique of sowing or planting individuals in a row at specific distances from each other which is pre-decided and measured on the plot.
Heap Planting	Crops especially tree crops are planted above ground with application of soil or compost around the plant in the form of heap. No pit is dug to plant the trees.
Gap Filling	The gaps in the crops emerging after sowing, arising due to non-germination, are filled with the seeds of the main crop in the first round whereas in the second round seeds of crops other than the main crop are sown. Thus this two stage gap filling enhances the crop diversity in the farm along with efficient utilization of the land area.

Method: Seeds Management	
Technique	Description
Seed Treatment	Various field treatments on seeds using organic inputs as a measure of pest control and or nutrient supplement are considered under Seed Treatment.
Seed Testing	Field tests conducted on seeds to assess various properties of seeds like germination are included in Seed Testing.
Seed Storage	Various techniques through which seeds are safely stored for future use are considered as Seed Storage.
Seed Production	This includes the process of production of seeds on the farm for self-use.

Method: Pruning-Grafting Techniques	
Technique	Description
Pruning	The techniques of pruning of climbers and trees in a specific manner to manipulate the growth of the plants are included here.
Grafting	The grafting techniques used to enhance the growth of trees especially fruit trees are considered here.
Climber Arrangement	Arrangement of the climber along with its branching done with specific objective of gaining from maximum interception of sunlight through leaves is termed as Climber Arrangement.

Method: Multiple Cropping	
Technique	Description
Relay Cropping	Relay planting is interplanting (or intersowing) of seeds (or seedlings) of the following crop in preceding (maturing) annual crop.
Multistoried Cropping	Plantation of different crops such that the canopies of the crops fall one below the other is termed here as Multistoried Cropping.
Mixed Cropping	Mixed cropping is defined as growing of two or more crops grown simultaneously and intermingled without any row arrangement.
Intercropping	Growing of two or more crops grown simultaneously in alternate rows or otherwise in the same area, where there is a significant amount of intercrop competition is termed as Intercropping.

Method: Other	
Technique	Description
Terrace Gardening	Growing food crops on terraces in pots or beds are considered under the broad heading of Terrace Gardening.
Harvesting	Various techniques of harvesting the crop/fruits so as to enhance the fruiting quality and vigor of the crop are collectively categorized as Harvesting Technique.
Commercial Crops	Cultivation of non-food or uncommon crops having market value are considered under the general heading of commercial crop cultivation.

Other Practices

Method: Unconventional Methods	
Technique	Description
Music Therapy	This is the technique of playing music for the plants in an attempt to enhance the growth of the plants.
Burnt Offerings	'Home-Hawan' a process in the Hindu mythology in which various organic material are burnt with the objective of destroying the evil elements.

Method: Minor Forest Produce	
Technique	Description
Honey Collection	Sustainable harvesting techniques of honey from honeybee comb are considered under honey collection.

Method: Low Cost Fuel Generation	
Technique	Description
Fuel from Non-woody Biomass	Non-woody biomass like grass, crop residue etc. is converted in a form in which the same can be used effectively as fuel for cooking.

Method: Low Cost Construction Material	
Technique	Description
Roofing Sheets of Biomass Fiber	In this technique the fibers from plant biomass are isolated and compressed into a sheets that can be used for roofing.

Annexure IV. Sustainable Cultivation Practitioners and their Techniques

Practice:

Weed Management

Method: Weedicides

Techniques: Respondent Number*

Salt + Caustic Soda + Water

Salt, caustic soda and water in proportion of 1:1:10 is used for eradication of weeds.	83
--	----

Method: Sowing Time Management

Techniques: Respondent Number*

Early Sowing

Sowing of seeds is done prior to rains.	94
---	----

Method: Recycling Weeds

Techniques: Respondent Number*

Uprooting

Hand-weeding of weeds in vegetable plots and laying them on bunds for decomposition.	105
--	-----

Trampling

Rolling-over by Bullock and Plank	94
-----------------------------------	----

Limited Pruning

Pruning of weeds only in early stage of crop as later the crop overtakes the weeds.	94
---	----

Burying Weeds in Soil

Weeds allowed to grow for 3 months and then mixed/buried in the soil by tillage.	4
--	---

Practice:

Water Management

Method: Watering Close to Root-tips

Techniques: Respondent Number*

Appropriate Placement of Irrigation Channels

Irrigation channels for Coconut are located close to the outer boundary of canopy cover.	83
--	----

Irrigation channels of Sweet oranges away from main stem and close to the outer boundary of canopy spread on ground.	94
Irrigation channels for fruit trees like Coconut, Saphota are placed near the outer boundary of the canopy cover on the ground.	100

Method: Soil Moisture Monitoring

Techniques: Respondent Number*

Plantation of Moisture Indicator Plants

Plantation of Croton and Acalifa plant species as indicators of moisture.	6
---	---

Method: Mulching

Techniques: Respondent Number*

Plant Biomass Mulch

Grasses, weeds used as mulch.	8
Compacted dry grass is used in form of thick mulch.	96
Plant biomass of Glyricidia sp. used as mulch.	265

Other (than plant biomass) Mulch

Plastic mulch used in vegetable cultivation both for water conservation and weed control.	265
Stone mulch is used for Mango plants in which stones (cobbles) placed around the stem are given a slight slope.	273
Plastic Mulch used especially for fruit trees.	273

Method: Building Cost-effective Storage Structures

Techniques: Respondent Number*

Fabricated Tanks

Biogas tank is raised above ground on cement pillars and crops irrigated by gravity flow. Storage cost is just 30 paisa per liter.	149
--	-----

Practice:

Soil & Nutrient Management

Method: Tillage Operations

Techniques: Respondent Number*

Soil Piercing

Piercing the soil around crops like Banana, Drumstick with long pointed tool and giving a slight upward jerk.	96
---	----

Medium Tilla ge

Use of bullock driven plough (tillage depth of upto 6 inches)	4
---	---

Method: Soil & Nutrient Conservation (farm level)	
Techniques:	Respondent Number*
<i>Upstream Forest Conservation</i>	
Ban on cutting in forest since 1993.	95
<i>Terracing</i>	
Slopping land turned into terraces with 5 steps over a period of 15 years.	105
<i>Contour Cultivation</i>	
Crops sown on the contour lines drawn across slope.	7
Small bunds are prepared as per contour and then sowing is done parallel to the bunds.	8
Marking of contour by simple contour marker and then creating furrows and ridges according to the contours marked.	105
<i>Bund Cultivation</i>	
Tuber crop cultivation on hill slopes to create a live bund.	6
Contour bunds build across the slope after some rows of contour cultivation.	7
Leguminous weeds cultivation e.g. Tephrosia sp., Wild Pigeon pea, Wild Green gram, Wild Embilca sp.	8
Leguminous weeds cultivation.	94
Ipomea sp. grown on bunds.	95

Method: Plant Biomass Manuring	
Techniques:	Respondent Number*
<i>Leaf-litter Manuring</i>	
Crop residue of cotton is spread over the farmland. Once the leaves get dried roller is moved on the residue for the leaves to fall on the soil. The leaf-litter benefits the soil as manure while the sticks can be used as fuel.	8
Leaf litter from forest collected and used in rice cultivation.	95
<i>In situ Green Manuring</i>	
Cow pea + Green gram + Sannhemp + Black gram + Pear millet + Great millet	4
Greening of fence by planting diverse plants for green manure production.	96
Sannhemp (<i>Crotalaria juncea</i>) sp. and Dhaincha (<i>Sesbania aculeata</i>) sp. used for green manuring.	149
Green Manuring crops cultivated in the interspaces of the main crop.	162
Multistoried cropping Great millet, Maize - Marigold, Mustard - Legumes as green manuring crops.	184
Pigeon pea + Fenugreek + Bengal gram + Coriander + Great millet	216
Groundnut, Pigeon pea, Sannhemp (<i>Crotalaria juncea</i>).	271

Exsitu Green Manuring

Green biomass from Glyricidia plants cultivated on bunds is used for manuring.	83
Green manuring from plant biomass of Glyricidia sp. cultivated on bunds	176
Greening of bunds especially by Glyricidia plants.	216
Green manuring from Glyricidia and other biomass cultivated on bunds.	264

Method: Nutrient Supplement

Techniques: Respondent Number*

Vermiwash Supplements

Prepared in small plastic containers. Sprayed on plants as growth hormones and pests resistance (experiment).	7
---	---

Plant Biomass Based Supplements

Extract of variety of leaves is used through irrigation water.	96
Neem + Glyricidia sp. + Leucaena ('Subabhul')	271

Oil Cake Supplements

Mixture of various type of Oil cakes is used.	162
---	-----

Chemical Fertilisers Based Supplements

Foliar spray of diluted Urea.	26
Urea-DAP Brickets for Rice cultivation.	315

Cattle Dung/Urine Based Supplements

Dung + Urine + Jaggery	3
Dung + Urine + Jaggery + Water; Applied by tin containers in rainy season whereas by flow irrigation in other seasons.	4
Dung + Urine + Jaggery + Water	7
Cow pit pat prepared using cow dung and biodynamic preparation.	31
Cattle urine applied over the cultivated land by mixing it with the irrigation water.	83
Dung slurry used in diluted form.	83
Dung + Urine + Jaggery	105
Dung + Urine + Jaggery	149
Cow dung or Biomass + Jaggery + Legume flour + Ripped Banana + Cow urine	162
Cattle urine applied on foliage.	175
Biomass of Glyricidia plants mixed with Biogas slurry in form of layers.	176
Dung + Urine + Jaggery	181
Dung + Ghee + Honey	181
Dung + Urine + Jaggery	182
Dung + Urine + Jaggery	184
Dung + Urine + Jaggery	223
Dung + Ghee + Honey	243

Cow dung + Cow Urine + Bengal gram + Black gram + Soyabean+ Coconut + Lentil + Groundnut oil + Jaggery	267
Cow pit pat prepared using cow dung and biodynamic preparation.	271
Biogas Slurry + Urine + Oil Cake + Pulses Flour + Jaggery + Butter Milk	276

Ash Su plements

Fly ash procured from thermal power plants applied to cultivated soil (experiment).	7
Application of Ash especially for Banana.	96
Rice-husk Ash is applied for nursery of rice.	315

Animal Meal Su plements (remains of dead animals)

Horn Manure is prepared by putting cattle dung in the horns of dead cow for three months and then used as nutrient supplement by taking 10 grams in 15 liters of water for 1 acre. This supplement is used thrice a year.	31
Horn Manure	181
Decomposed buried dead animals are used as manure ('Samadhi Manure')	245
Horn Manure	245
Horn Manure	271

Method: Ex-situ Soil Addition

Techniques: Respondent Number*

Soil Under Ficus (Ban yan) Trees

Promotes use of soil under ficus trees.	3
Six inches top soil beneath ficus plants is removed and 10 to 15 kg. (dry weight) is applied per acre.	243

Roadside Ex-situ Soil / Dust Addition

Collection of roadside soil by sweeping and application of the same in cultivated soil.	96
Soil dust and ash are applied together as measure for building disease resistance.	149

Pot Filling

Pots for terrace gardens are filled with plant biomass and thin layer of soil on top.	26
---	----

Ex-situ Soil Bed Preparation

Plant Biomass with thin layer of soil on the top is used for cultivation of crops in pots.	26
Soil beds comprising of soil, sand, farmyard manure and rice husk are prepared on barren land especially the laterite rock.	268

Ex-situ Alluvial Soil Addition

Alluvial soil applied at rate of 140 cubic feet per 1000 square feet of land area.	149
--	-----

Method: Compost

Techniques:

Respondent Number*

Tank Vermicom post

Use of pig excreta (procured from own pig farm) along with cattle dung, biomass etc.	6
Series of brick tanks which facilitates the movement earthworms are use.	7
Vermicomposting done in small drums placed after every 5 Banana trees.	182
Tanks with brick side walls of low height (1 ft.) are used.	245
Production and sell of compost and culture to local farmers in individual capacity.	271
Vermicomposting in tanks with brick side walls.	315

Tank Com post

Tank with wire mesh side walls used for vermicompost.	3
Biogas slurry, plant biomass (like Kuda, Glyricidia, Moha, Papaya, Banana, Chafa, Weeds) & Poultry Waste.	264
Tank below ground used for composting hotel and vegetable market waste. Urine from cattle shed chanelised to the tank.	265

Pit Compost

Crop residue, grasses, weeds are dumped in pit for composting.	217
--	-----

Open Vermicom post

Vermiculture is introduced in a open heap of partially decomposed matter laid on a cemented floor.	7
Compost beds laid as heaps under shade.	265

Nadep Compost

Minimum 3 ton of organic matter required. Compost ready in 3 months.	7
--	---

Insitu Mulch Com post

Crop residue and other biomass allowed to decompose on ground surface (called as Surface Composting)	94
Crop residue and other biomass spread over soil for decomposition.	217

Insitu Hea p Compost

Biomass heap in irrigation channels	83
Biomass heap is laid in irrigation channels.	96
Biomass heaps laid in irrigation channels of fruit trees like Coconut, Saphota.	100
Areca nut Extract (waste from Gutkha Factory) is used in the heap laid close to irrigation channels.	100
Biomass heaps laid in irrigation channels of sugarcane and coconut trees.	167

Heap Compost

Compost from heap applied at rate of 1.4 ton (dry weight) per 1000 square feet of land area.	149
Grass is cut and made into a heap with a layer of soil on the top. The decomposed matter is used for vegetable crops.	274

Heap & Pit Compost

The heap part covered from sides by walls made of Bamboo sticks	7
---	---

Farmyard Manure (Heap/Pit)

3 ton per acre applied for cotton, wheat.	4
Rice husk is added in the manure for increasing soil aeration.	10
Applies FYM only if the crop yields profit.	105
Crop residue and waste turned in FYM	182
Rice husk is added in the manure for increasing soil aeration.	268

Waterhyacinth Compost

Experimentation on composting of waterhyacinth.	7
---	---

Practice:

Pest Management

Method: **Traps**

Techniques: Respondent Number*

Sticky Trap

Sticky barrier for Mealy Bugs on Zizyphus sp.	8
---	---

Odour Trap

Ocimum sp. ('Tulsi') used to trap fruit fly.	83
--	----

Light Trap

Filament bulb (200 watts) with bucket placed below is used to traps insects.	172
--	-----

Food Trap

Spongy portion in coconut fruit at the time of germination or fermented juice of other palm trees (called "Neera") can use as food bait for Red Palm Weevil.	83
--	----

Method: **Predator Propagation**

Techniques: Respondent Number*

Medium Preparation

Rice husk is soaked for a night and then Trichoderma culture is spread over the husk. This medium is then used for application in soil.	275
---	-----

Attracting Predators

Plantation of Bixa sp. which acts as site of reproduction for Ladybird beetles.	6
---	---

Method: **Organic Pesticides**

Techniques: Respondent Number*

Urine Based Pesticides

Urine Spraying	7
Urine + Garlic + Neem	7

Urine spraying.	83
Spraying of urine.	149
Milk, Butter Milk, Cattle Urine used in sequential manner.	162
Urine spraying.	182
Urine + Neem	216
Cow Urine + Neem Extract	223
Cow Urine + Green Chili Extract	243
Urine + Ocimum ('Tulsi')	245
Urine + Neem (Pot Fermentation)	245
Urine + Cow dung especially used for Leaf curl disease on Chili plants.	264
Spraying of urine on crops by using hand pump.	267
Urine + Non-palatable (for cattle) Plant Leaves	276

Sticker Application

Black Jaggery used as sticker during application of organic pesticides.	315
---	-----

Plant Based (Botanical) Pesticides

Neem extract	7
Garlic + Chili + Tobacco	7
Neem seed extract	8
Garlic + Chili + Tobacco	8
Neem extract.	26
Pongamia sp. (Karanj) seed extract	175
Garlic + Chili + Tobacco	182
Neem + Leaves from various type of plants Neem + Castor + Papaya + Argimone mexicana + Vitex + Pongamia + Ipomea sp. Etc. (called as 'Dash Parnarka' i.e. comprising of leaves of 10 different plant species)	243
Garlic + Chili + Tobacco	271
Ipomea sp. Extract	315
Vitex nigunda ('Nirgudi') Extract	315

Other Organic Material Based Pesticides

Butter milk spraying on crops for protection against Leaf curl disease on Chili.	267
--	-----

Method: Multiple Cropping

Techniques: Respondent Number*

Repellant Crops

Marigold cultivated (mixed cultivation) in Sweet potato as a control measure against Nematodes.	175
---	-----

Combination of Crop Varieties

Cultivation of two different varieties of the same crop. E.g. ICPL 87 and Richa 2000 varieties of Pigeon pea are cultivated together to benefit from reduction in pest infestation due to differences in growth patterns and host plant resistance.	175
---	-----

Method: Exploiting Host Resistance

Techniques: Respondent Number*

Selection of Pest-Resistant Variety

Local variety of Okra preserved and used for cultivation as a control measure against Yellow Vein Mosaic.	275
---	-----

Method: Collection and Destruction

Techniques: Respondent Number*

Shaking Plants

Plants of Pigeon pea are shaken during early morning and pod borer caterpillars are collected and destroyed.	8
--	---

Aphid Clearing

Clearing Aphids by spraying water over the infected parts.	96
Clearing Aphids by applying brush over the infected surface.	96

Practice:

Microclimate Management

Method: Shade Development

Techniques: Respondent Number*

Fast Growing Exotic + Slow Growing Indigenous

Leucaena sp. + Ficus sp.	8
Glyricidia sp. + Ashoka pendula + Hardwickia binata (Anjan)	223

Practice:

Fencing Management

Method: Green Fencing

Techniques: Respondent Number*

Thorny Green Fence

Plants of acacia sp. used in green fence.	216
---	-----

Bamboo Green Fence

Bamboo is planted in the fence as a live post while the branches spreading horizontal are used as laterals.	8
---	---

Method: Animal Deterrents

Techniques: Respondent Number*

Making Available Water Non-potable

Make the available potable water muddy so that the large pests especially the Monkeys find it non-potable and hence are discouraged to forage in the farm.	267
--	-----

Low Cost Wired Fencing

A single strand of plain wire (like binding wire) is laid around the farm to scare the Wild boars.	105
--	-----

Creating Foul Odour

Placing fish meal around the fence of the farm so that the larger pests like Monkeys are discouraged due to the foul odour of the fish meal.	267
--	-----

Practice:

Crop Management

Method: Sowing & Planting Operations

Techniques: Respondent Number*

Sowing Time

Sowing at 'Akshay Tithiya' a religious and auspicious date in Hindu Calendar which falls in the month of April to May.	264
--	-----

Sowing Beds of Diverse Shapes

Sowing beds of different shapes (like heap shaped, key/chulha shaped) are prepared for enabling ease of operations and diversity enhancement.	8
---	---

Plant Propagation

Nursery sapling prepared by using tillering method and organic inputs.	7
Improvement and propagation of local perennial fruit trees like Zizyphus sp.	8

Measured Planting Distance

Controlled Transplantation of rice saplings (15 x 25 cm. Or 20 x 20 cm.)	315
--	-----

Heap Planting

Trees like Banana planted above ground supported by heap of soil and compost.	149
---	-----

Gap Filling

Gap filling is done twice. In second gap filling, seeds of plants other than cotton (like marigold, cow pea) are sown, so as to increase the biodiversity and develop favourable plant associations.	7
--	---

Method: Seeds Management

Techniques: Respondent Number*

Seed Treatment

Seeds are well mixed (before sowing) in mixture of cattle urine, cow dung and soil from termite mound (2:1:1). This leads to better root growth, higher rate of germination, resistance against fungal diseases and allows early breaking of seed dormancy.	7
---	---

Urine + Dung + Termite Mound Soil	94
Urine + Dung + Termite Mound Soil	175
Dung + Ghee + Honey	243
Treatment of ghee (clarified butter) on Radish seeds.	267

Seed Testing

Germination Test done by observation of sprouting rate of seeds placed in soaked paper.	7
---	---

Seed Storage

Ash and Castor oil (0.5 lit. oil for storing 100 kg grains) is mixed with grains and stored in air-tight container.	7
Seed bank of local varieties and its propagation through organizational efforts.	172
Local seed varieties are stored by mixing ash and Neem leaves	173

Seed Production

Local varieties of crops like vegetables, cotton, are selected for sowing and propagation only after trial experiments for 3-4 years.	8
70% of the seeds sown in 30 acres (mainly vegetables) is produced in-house and represents the traditionally conserved varieties.	105
Collection and propagation of local varieties of crops especially Great millet.	173
Production and use of local seed varieties.	216
Own seed produced and used.	217
Production and use of seeds.	315

Method: **Pruning-Grafting Techniques**

Techniques:

Respondent Number*

Pruning

Pruning of trees and climbers to control growth of crops cultivated in pots.	26
Apical-bud pruning in Cucurbits	96
Pruning of perennial climbers especially Little gourd.	96
Pruning of Drumstick plants such that the fruiting remains at accessible height.	96
Pruning of quarter portion of onion leaves from the apex to facilitate tuber growth.	149
Trampling of onion leaves to dampen the foliage growth and facilitate tuber growth.	149
Male flower is pruned by hands instead of using any metallic implement so that the even the new flowers bears large size fruits thus giving a uniform fruit bunch.	243

Grafting

Bridge grafting for Mango Plants	94
----------------------------------	----

Climber Arrangement

Pruning of overlapping branches and arranging the climbers such that every part receives sufficient sunlight.	96
---	----

Method: Multiple Cropping

Techniques: Respondent Number*

Relay Cropping

Pigeon pea + Coriander + Beet + Bengal gram + Chili	276
---	-----

Multistoried Cropping

Combination of medium and long duration fruit crops like Sapota, Guava and Banana.	100
--	-----

Mixed Cropping

Sowing of vegetable seeds randomly in the rice nursery.	95
---	----

Intercropping

Cotton + Pigeon pea	7
Cotton + Pigeon pea + Great millet + Black gram	8
Sugarcane + Rice	167
Great millet + Bengal gram	175
Rice + Soyabean + French bean	175
Green gram + Great millet + Pigeon pea + Green Manure Crops	216
Wheat + Bengal gram	216
Cluster Bean + Marigold + Indian Beans	264
Cotton + Cowpea or Pigeon pea	271
Cowpea + Okra + Beans	274
Brinjal + Groundnut	274
Sugarcane + Melia azedarach trees (Bakan)	276
Sugarcane + Vegetables	276

Method: Other

Techniques: Respondent Number*

Terrace Gardening

Plastic bag containers used for crop cultivation.	26
Leafy vegetables are cultivated on specially prepared thatched roof (10 ft. above ground) in homestead garden to protect the crops from domestic hens.	264

Harvesting

Harvesting the first fruits of crops like Pigeon pea, Chili etc. so as to benefit from the vigorous growth of subsequent fruits.	7
--	---

Commercial Crops

Aromatic Crops cultivated using organic inputs.	7
Medicinal plants cultivated using organic inputs.	7

Practice:

Other Practices

Method: Unconventional Methods

Techniques: Respondent Number*

Music Therapy

Indian classical music is played in plots where grapes are cultivated during the early morning (about 2 hours).	184
---	-----

Burnt Offerings

'Agnihotra' a process of burnt offerings is performed in the farm.	223
--	-----

Method: Minor Forest Produce

Techniques: Respondent Number*

Honey Collection

Eco-friendly honey collection technique from bee-hives of Rock Bees	7
---	---

Method: Low Cost Fuel Generation

Techniques: Respondent Number*

Fuel from Non-woody Biomass

Coal Brickets from Non-woody biomass is obtained from charring unit.	7
--	---

Method: Low Cost Construction Material

Techniques: Respondent Number*

Roofing Sheets based on Biomass fiber

Roofing Sheets prepared from fibers of Banana tree.	7
---	---

**Annexure V-A. Yield Levels
(A) Yield Potentials¹ Achieved by the GISCs**

Sr. No.	Crop	Productivity³ (Quintal/ha)	Soil Manure and Pest Control Inputs	Sample Size²
1	Coconut	100 (fruits / plant)	Only organic inputs	8
2	Cotton	40.00	Only organic inputs	14
3	Grapes	550.00	Only organic inputs	15
4	Great millet Sorghum	64.00	Only organic inputs	5
5	Onion	625.00	Only organic inputs	10
6	Pigeon pea	15.00	Only organic inputs	4
7	Pigeon pea	25.00	Only organic inputs except for a limited use of artificially synthesized chemical pesticides	4
8	Rice	37.50	Only organic inputs	15
9	Rice	50.00	Combination of organic and inorganic inputs	15
10	Soyabean	166.67	Only organic inputs	4
11	Sugar cane	1750.00	Only organic inputs	3
12	Turmeric	225.00	Only organic inputs	3
13	Wheat	33.33	Only organic inputs	3

Notes:

1. Yield potentials represents the maximum of the reported yield values as given by the various respondents for particular crops.
2. The sample size represents the number of respondents who have reported yield values for the particular crops. In this table maximum reported yield values of only those crops are included the yield values of which have been reported by at least three respondents (values of others have been presented in next table).
3. The values of yield were reported by the respondents for specific area under cultivation for the particular crops ranging from 100 sq. ft. to 20 acres. These figures have been extrapolated for presentation in the above table to maintain a common unit i.e. quintal per hectare.
4. The above values have been reported by the GISCs through the questionnaire or during the interview. These values were not physical verified during the survey.

Annexure V-B. Yield Levels
(B) Yield Values Reported by the GISCs *

Sr. No.	Crop	Productivity (Quintal/ha)	Soil Manure and Pest Control Inputs
1	Areca palm	15.00	Only organic inputs
2	<i>Emblica officinalis</i> ('Avala')	142.86	Only organic inputs
3	Banana	693.75	Only organic inputs
4	Bengal gram	25.00	Only organic inputs
5	Black gram	10.00	Only organic inputs
6	Cashew	1.56	Only organic inputs
7	Chilli	400.00	Combination of organic and inorganic inputs
8	Coriander	225.00	Only organic inputs
9	French bean	17.50	Only organic inputs
10	Green gram	87.50	Only organic inputs
11	Groundnut	37.50	Only organic inputs
12	Guava	330.19	Only organic inputs
13	Jujube	500.00	Only organic inputs
14	Mandarin ('Santra')	100.00	Only organic inputs
15	Papaya	137.50	Only organic inputs
16	Pearl millet	20.00	Only organic inputs
17	Sesamum	8.75	Only organic inputs
18	Sweet Orange	125.00	Only organic inputs
19	Tomato	750.00	Only organic inputs

* Note:

- In this table reported yield values of those crops are included which have been reported by less than three respondents.
- The values of yield were reported by the respondents for specific area under cultivation for the particular crops ranging from 100 sq. ft. to 20 acres. These figures have been extrapolated for presentation in the above table to maintain a common unit i.e. quintal per hectare.
- The above values have been reported by the GISCs through the questionnaire or during the interview. These values were not physical verified during the survey.

**Annexure VI-A. Contact Database
(A) Validated (Interviewees)**

Respondent No.: 3	Respondent No.: 4
Manohar Parchure, Natural Agriculture Resource Center Village Ambhora, PO Sindivihiri , Dist. - Wardha - 442203 (Farm) Tel. No.:0712-543611, 539827, 534420, Mobile- 98203424	Anand Subhedar, Village Tiwasa, Tal. - Yavatmal, Dist. - Yavatmal Tel.: 07232-244859, 265441.
Practices Documented: Yes	Practices Documented: Yes
Respondent No.: 6	Respondent No.: 7
Deepak Vichare, Reliance gas agency, Mahalaxmi complex, Shivaji Nagar, Tal.- Dapoli - 415 712, Dist.- Ratnagiri Tel. No.:O-02358-82952, R-02358-82320	Dr. Tarak Kate, Dharamitra - An Eco-Technology Resource Group for Sustainable Development Bank Of India Colony, Nalwadi, Dist. - Wardha - 442 001 Tel. No.:Off-07152-50584, 249658 R -44408
Practices Documented: Yes	Practices Documented: Yes
Respondent No.: 8	Respondent No.: 10
Ashok Bung, Chetana Vikas Alternative Agricultural Resource Centre (AARC), Post Gopuri, Dist. - Wardha-442001, Maharashtra. Tel. No.:07152_40806 (off), 240004, 252915 (Farm- Niranjana)	Pandurang B. Naik, Paned, Post Kamarli, Taluka Pen, Raigad
Practices Documented: Yes	Practices Documented: Yes
Respondent No.: 26	Respondent No.: 27
Dr. R. T. Doshi, R. T. Doshi Foundation Jamunotri, 26th Road, Bandra (West), Mumbai- 400050. Tel. No.:022-6401439	Mohan S. Deshpande, Shri Samartha Agricultural Research Centre, Khede, Tal.- Ajra, Dist.- Kolhapur Tel. No.:0232-46630 0232-46320
Practices Documented: Yes	Practices Documented: No
Respondent No.: 31	Respondent No.: 46
Dr. Alexander V. Daniel, Institute of Integrated Rural Development Post -Bidkin[Selpuri Road], Tal. - Paithan, Dist.- Aurangabad -431002 Tel. No.:R-0240-2376336, O -02431-241534	Arun Desai, Krushi Seva Kendra Beside Namrata Hotel, Post/ Tal. - Gadhinglaj, Dist. - Kolhapur Tel. No.:0236170/236270/236186
Practices Documented: Yes	Practices Documented: No
Respondent No.: 52	Respondent No.: 83
K. R. Datye, Chaitravan, Hanuman Cross Road, Vile Parle East , Mumbai-400507	Raghunath V. Naik, At Post - Aros, Dandeli , Varacha Wada, Tal.- Savantwadi, Dist.- Sindhudurg - 416514 Tel. No.:02363 - 260034
Practices Documented: No	Practices Documented: Yes

<p style="text-align: right;">Respondent No.: 94</p> <p>Raosahab Dagadkar, Nehru Nagar, Tal.-Dhamangaon, Dist.- Amaravati</p> <p style="text-align: right;">Practices Documented: Yes</p>	<p style="text-align: right;">Respondent No.: 95</p> <p>Kaluram Dhongda, Kashtkari Sanghatana Shisne Patil Pada, Post Dhundalwadi, Tal.- Dahanu, Dist.- Thane - 401602</p> <p style="text-align: right;">Practices Documented: Yes</p>
<p style="text-align: right;">Respondent No.: 96</p> <p>Arjun Rajgopal, 7/C-12, Kety Nagar, Tal. -Dahanu - 401602, Dist. - Raigad Tel. No.:02528 - 22118/221815 (Residence), 02620- 2576905 (Farm-Khatalwadi)</p> <p style="text-align: right;">Practices Documented: Yes</p>	<p style="text-align: right;">Respondent No.: 100</p> <p>Bhaskar Save, P. O. Dehri, Tal.- Umbergaon, Valsad, Dist. - 396 170, Gujrat Tel. No.:0260-2562126</p> <p style="text-align: right;">Practices Documented: Yes</p>
<p style="text-align: right;">Respondent No.: 105</p> <p>Subhash Sharma, Choti Gujri, Dist.-Yavatmal Tel. No.:07232 - 240956</p> <p style="text-align: right;">Practices Documented: Yes</p>	<p style="text-align: right;">Respondent No.: 149</p> <p>Kunjbihari Rawat / Shaila Borole, Tal. - Bhusaval, Dist. - Jalgaon</p> <p style="text-align: right;">Practices Documented: Yes</p>
<p style="text-align: right;">Respondent No.: 156</p> <p>Mukta Dabholkar, Opposite Mandlik Chwol, Post - Dapoli, Dist. - Ratnagiri</p> <p style="text-align: right;">Practices Documented: No</p>	<p style="text-align: right;">Respondent No.: 162</p> <p>Suresh Desai, Basavprabhu, Post - Bedkihal, Tal. - Chikodi, Dist. - Belgaon 0831-662056</p> <p style="text-align: right;">Practices Documented: Yes</p>
<p style="text-align: right;">Respondent No.: 167</p> <p>Pratap R. Chiplunkar, 743 E, Shahupuri, Lane No. 3, Dist. -Kolhapur Tel. No.:(0231) 2653754</p> <p style="text-align: right;">Practices Documented: Yes</p>	<p style="text-align: right;">Respondent No.: 170</p> <p>Ashok Kothare, 527, 12 Road, Chembur, Mumbai - 400071</p> <p style="text-align: right;">Practices Documented: No</p>
<p style="text-align: right;">Respondent No.: 172</p> <p>Sarang Pande, Lokpanchayat Lane No. 3, Shivaji Nagar, Post, Tal. - Sangamner, Dist. - Ahmednagar - 422605</p> <p style="text-align: right;">Practices Documented: Yes</p>	<p style="text-align: right;">Respondent No.: 173</p> <p>Prakash Reddy, Dharti Bachao Aandolan Sambhajinagar, Khadgaon Road, Dist. - Latur -413512 Tel. No.:02382-222452</p> <p style="text-align: right;">Practices Documented: Yes</p>
<p style="text-align: right;">Respondent No.: 175</p> <p>Pradeep Nikam, Indoli, Tal.- Karad, Dist. - Satara Tel. No.:02164-64805</p> <p style="text-align: right;">Practices Documented: Yes</p>	<p style="text-align: right;">Respondent No.: 176</p> <p>Anant Keshav Nar, Ujgaon, Tal. - Sangameshwar, Dist. - Ratnagiri</p> <p style="text-align: right;">Practices Documented: Yes</p>

<p style="text-align: right;">Respondent No.: 180</p> <p>Datta Patil/ Pawan Kumar Mishra, Yuva Rural Kamgar Bhavan, Baidyanath Chowk,Nagpur Tel. No.:2751511/2551812,98222 27637</p> <p style="text-align: right;">Practices Documented: No</p>	<p style="text-align: right;">Respondent No.: 181</p> <p>Gangaprasad Agarwal, Akhil Bhartiya Sarvaseva Sangh Rachana Samiti Tal. -Wasmal, Dist.- Hingoli - 431512 Tel. No.:02454-220258 / 220692</p> <p style="text-align: right;">Practices Documented: Yes</p>
<p style="text-align: right;">Respondent No.: 182</p> <p>Shekh Masum S. Ahmad, Sajeev Sheti Shetkari Mandal Patoda (Maw) Tal.- Partur, Dist.- Jalna</p> <p style="text-align: right;">Practices Documented: Yes</p>	<p style="text-align: right;">Respondent No.: 184</p> <p>Vasudeo C. Kathe, Kasbe Sukene, Tal. - Nifad, Dist. -Nashik - 422 302 Tel. No.:02550-279235</p> <p style="text-align: right;">Practices Documented: Yes</p>
<p style="text-align: right;">Respondent No.: 223</p> <p>Vasantrao K. Thakre, 'Vrukshawalli' 5 B,Nutan Krushi nagar,Near Vidyavardhini college, Sakri road, Dist.- Dhule Tel. No.:02562-202394</p> <p style="text-align: right;">Practices Documented: Yes</p>	<p style="text-align: right;">Respondent No.: 245</p> <p>Sunil Mansinghka, Kamdhenu Sevashram Badkas Chowk, Chitaar ali [lane], Mahal, Nagpur - 440002 Tel. No.:0712-0772273</p> <p style="text-align: right;">Practices Documented: Yes</p>
<p style="text-align: right;">Respondent No.: 216</p> <p>Sandipan Badgire, Latur Dist. Nisarg sheti Prasarak Sanstha 'Savali' Tanaji chowk, Anandnagar,Dist.- Latur- 413512 Tel. No.:02382-244243</p> <p style="text-align: right;">Practices Documented: Yes</p>	<p style="text-align: right;">Respondent No.: 217</p> <p>Dr. M.R.Pachegaonkar, Marathwada Devani Go Paida Sah. Sanghatana, Latur & Latur Jilha Nisarg Sheti Vikas Mandal Latur Post - Poharegaon,Tal.- Renapur, Dist. - Latur Tel. No.:0282-232560</p> <p style="text-align: right;">Practices Documented: Yes</p>
<p style="text-align: right;">Respondent No.: 263</p> <p>Anand Vaidya, Disha Organisation 12, Urmila Apt., Udaynagar,Tal. - Dapoli, Dist. - Ratnagiri</p> <p style="text-align: right;">Practices Documented: No</p>	<p style="text-align: right;">Respondent No.: 264</p> <p>Vilas Hode, Post - Nandlaj, Tal.- Sangameshwar[Devrukh], Dist. - Ratnagiri Tel. No.:02354-245896</p> <p style="text-align: right;">Practices Documented: Yes</p>
<p style="text-align: right;">Respondent No.: 265</p> <p>Dilip Narkar, c/o Hotel Vijay, Opposite S.T.stand,Tal. - Lanja, Dist. - Ratnagiri</p> <p style="text-align: right;">Practices Documented: Yes</p>	<p style="text-align: right;">Respondent No.: 266</p> <p>Devendra Patil, Bharatiya Kashtkari Rayat [Bhakar] Sanstha Post - Konde, Tal. - Lanja, Dist. - Ratnagiri</p> <p style="text-align: right;">Practices Documented: No</p>
<p style="text-align: right;">Respondent No.: 267</p> <p>Dada Gore, Post - Partavane,Tal. -Ratnagiri, Dist. - Ratnagiri</p> <p style="text-align: right;">Practices Documented: Yes</p>	<p style="text-align: right;">Respondent No.: 268</p> <p>Pandurang Behare, At post -Kurdhe, Tal./ Dist. - Ratnagiri</p> <p style="text-align: right;">Practices Documented: Yes</p>

<p style="text-align: right;">Respondent No.: 243</p> <p>Kisan M. Mahajan, Gajanan Nursary, Nisarg Sheti Mandal Jamnerpura, Bhusaval road, Tal. - Jamner, Dist. - Jalgaon Tel. No.:02580-232554/ 232454, Farm -230703, 232403</p> <p style="text-align: right;">Practices Documented: Yes</p>	<p style="text-align: right;">Respondent No.: 271</p> <p>Radhabai Shelke, Post - Tondoli [Bidkin], Tal. - Paithan,Dist. - Aurangabad Tel. No.: 38156979</p> <p style="text-align: right;">Practices Documented: Yes</p>
<p style="text-align: right;">Respondent No.: 273</p> <p>Chandrashekhar Bhadsavale, Saguna Bag, At -Malegaon, Post -Nerel,Tal. - Karjat, Dist. - Thane</p> <p style="text-align: right;">Practices Documented: Yes</p>	<p style="text-align: right;">Respondent No.: 274</p> <p>Laxman Pawar, At Post - Sai, Tal. - Panvel, Dist. - Raigad</p> <p style="text-align: right;">Practices Documented: Yes</p>
<p style="text-align: right;">Respondent No.: 275</p> <p>Anand Patkar, At Post - Vafoli, Tal. - Savantwadi, Dist. - Sindhudurg</p> <p style="text-align: right;">Practices Documented: Yes</p>	<p style="text-align: right;">Respondent No.: 276</p> <p>Shantinath Tardale, Post - Bedkihal, Tal. - Chikodi, Dist. - Belgaon</p> <p style="text-align: right;">Practices Documented: Yes</p>
<p style="text-align: right;">Respondent No.: 315</p> <p>V.V. Bhuskute / Dnyeshwar Nirgude, Dnyprabodhani, Pune Dnynaprabodhani Krushi -Tantrik Vidyalaya,Shivapur, Khopi, Tal. - Haveli, Dist. - Pune Tel. No.: 9520-24384013</p> <p style="text-align: right;">Practices Documented: Yes</p>	<p style="text-align: right;">Respondent No.: 326</p> <p>Shreeram Kalasapurkar/ Shashtikar, Vidharba Organic Farmers Association KGP Electronics, Near Aurved College Shivaji Nagar, Yavatmal - 444 001 Tel. No.:07232-243999</p> <p style="text-align: right;">Practices Documented: No</p>

Annexure VI-B. Contact Database
(B) Validated-other than interviewees (representative sample*)

Respondent No.: 148	Respondent No.: 152
Dr. Shripad Daftardar, Janseva Foudation (Selvas), Pune B/3, Prerna Society, 37/2, Erandwane, Pune 411 038 Tel. No.:020-5438795	Madhavrao Shankarrao Patil, Pimpalgaon Hareghar, Tal. - Pachore, Dist. - Jalgaon- 424 203
Respondent No.: 153	Respondent No.: 158
Dr. Mukund Gaikwad, 'Rajashri' 503, Sadashiv Peth, Pune -411030 Tel. No.:020-24478932	Shahaji S. Gore, Post - Gorewadi, Bukanwadi, Tal./ Dist. - Osmanabad Tel. No.:02472 - 232053
Respondent No.: 160	Respondent No.: 163
Namdevrao Mane, Post - Savarde, Tal. - Tasgaon, Dist. - Sangali	Baburao Phalke, Post - Phalkewadi (Bagni), Tal. - Walva, Dist. - Sangali
Respondent No.: 169	Respondent No.: 171
Subhash Lashkare, Vasundhara Ecology & Research Foundation 315, Narayan Peth, Vishwakarma Lane, Behind Modi Ganpati, Near Saraswat Bank, Pune 411030. Tel. No.:(020)4475396 / (020) 4482093	Maya K. Sorte, Savitribai Phule Mahila Vikas Mandal Vadval,Post - Vadval, Tal. - Chakur, Dist. - Latur Tel. No.:02381-255759
Respondent No.: 174	Respondent No.: 186
Sarjerao Hawle, Shreeram Nagar, Yogesh Building, Plot 24, Near Rammandir, Dist.- Aurangabad Tel. No.:0240-2338030 / R.:2635596	Yashwant M. Muratkar, Swasth Vima Yojana Derada, Post - Hamadapur, Tal. - Samudrapur, Dist. - Wardha Tel. No.:06949-234390
Respondent No.: 198	Respondent No.: 220
Ranjeet Bobade, Vikas Ganga Samajsevi Sanstha Post - Pandurna (Khurd), Tal. - Ghatanji, Dist - Yavatmal Tel. No.:07230-227068	Anandrao M. Phrande, Post - Ozarde, Tal. - Vai, Dist. - Satara Tel. No.:02167-68176
Respondent No.: 231	Respondent No.: 237
Anant Karve, 4843, Maharashtra Oil Mill, Navi Peth, Pandharpur, Dist. - Solapur-413304 Tel. No.:02186-223116,224632	Shamgonda P. Patil, Nisarg Sheti Vikas mandal Post - Kini, Tal. - Hatkanangle, Dist. - Kolhapur - 416112 Tel. No.:0230-2363320
Respondent No.: 240	Respondent No.: 248
Vishnu B. Chormale, Post - Dorale, Tal. - Barshi, Dist. - Solapur Tel. No.:02184-254260	Sanjay Badole, Post - Kasgi, Tal. - Umarga, Dist. - Osmanabad Tel. No.:02475-54774 ,262574
Respondent No.: 252	Respondent No.: 253
Balasaheb R. Patil, 1/129, Takvade Ves, Ichalkaranji, Dist - Kolhapur Tel. No.:0230-424102	Vishwasrao A. Patil, Lohara, Tal.- Pachora,Dist. - Jalgaon Tel. No.:02596-272240

*Note: Only a representative list of the complete database has been provided here. The complete list comprises of 67 contacts.

Annexure VI-C. Contact Database
(C) Non-Validated (representative sample*)

Respondent No.: 192	Respondent No.: 193
Vivek Sangai, Melghat Tirwadi Utpadak Shetkari Samuh, Savkar Phata, Tal.-Anjangaon, Surji, Dist.- Amaravati	Sahebrao Makode, Vanya Svapad Bachao Shetkari Samuh Amba Peth, Tal. -Ajangaon, Surji, Dist. - Amaravati
Respondent No.: 194	Respondent No.: 195
Vikramjeet Shah, Insapa Prkalpa Yuva Kamgar Bhavan, Baidyanath Chowk, Nagpur	Arvind Aande, Dhanodi, Tal. - Warud, Dist. - Amaravati
Respondent No.: 196	Respondent No.: 197
Madhukar Dhas, Dilasa (Pracharak) Post - Ghatanji, Tal. - Ghatanji, Dist - Yavatmal Tel. No.:07230 - 227537	Manohar Gade, Gramjyot Post - Raveri, Tal. - Ralegaon, Dist - Yavatmal Tel. No.: 07202 - 225791
Respondent No.: 199	Respondent No.: 200
Janardan Virutkar, Post - Pandurna (Khurd), Tal. - Ghatanji, Dist - Yavatmal	Kishor Moghe, Gramin Samasya Mukti Trust Post - Jalka, Tal. - Maregaon, Dist - Yavatmal Tel. No.:07235 - 233297
Respondent No.: 201	Respondent No.: 202
Gunwant Raut, Post - Jalka, Tal. - Maregaon, Dist - Yavatmal	Sitaramji More, Post - Ghoti, Tal. - Ghatanji, Dist - Yavatmal
Respondent No.: 204	Respondent No.: 205
Dnyaneshwar Dhage, Post - Giroli, Tal. - Selu, Dist - Wardha	Pramod Kapse, Bahujan Bahuddeshiya Sanstha Post - Vijaygopal, Tal. - Devali, Dist - Wardha
Respondent No.: 206	Respondent No.: 207
Ghanshyam Bhimate, 'Dharamitra', 'Dharamitra', Bank of India Colony, Nalwadi, Wardha Tel. No.:250584	Devendra More, Zadgaon, Post - Chincholi, Tal. - Dhamangaon Railway, Dist - Amaravati Tel. No.:07232 - 242036
Respondent No.: 208	Respondent No.: 209
Shravan Jadhav, Zadgaon, Post - Chincholi, Tal. - Dhamangaon Railway, Dist - Amaravati	Ashok Rathi, Zadgaon, Post - Chincholi, Tal. - Dhamangaon Railway, Dist. - Amaravati
Respondent No.: 210	Respondent No.: 212
Sharad Jadhav, Post - Chincholi, Tal. - Dhamangaon Railway, Dist - Amaravati	Ramchandra Appa Kocharekar, Post - Nhaveli, Near Bidi Karkhana, Tal. - Savantwadi, Dist - Sindhudurg - 416510 Tel. No.:02363 - 278815
Respondent No.: 215	Respondent No.: 219
Yogini Arvind Shete, Matoshri Mahila Mandal Nimboli, Gajanan Mandir, Wardha Tel. No.:07152 - 246947	Kashinathbhai Patil, Post - Chinchani, Tal. - Dahanu, Dist. - Thane- 401503 Tel. No.:02525-42439

*Note: Only a representative list of the complete database has been provided here. The complete list comprises of 193 contacts.

Annexure VII-A. Survey Preparatory Material (A) Areas of Study

1. Preliminary Stage

The information heads collected in the preliminary stages are as follows:

Information Head	Details
Contact Information	Contact Name, Designation, Organization, Address (Resi./Off.), Address (farm), Region, Telephone No., Fax No., E-mail, Web-page,
Profession	Practitioner, Writer, Researcher/Study, Campaigner
Source of Information	Literature, Reference Person, Event

2. Intermediate Stage (Profile Building)

	Information Head	Details	
1	Type of sustainable cultivation:	Inputs & Operations	Pure organic inputs, Mix of organic and inorganic inputs, Manual work, Mechanized work, Tillage Operations
		Objectives	Self-Consumption, Profit earning, Research, Awareness and Education.
		Crops	Cereals, Vegetables, Fruits etc.
		Scale of operation	Area of cultivation, Seasons of cultivation, Number of years of cultivation
2	Landmark and achievements		Productivity patterns, Gestation period
3	Practices	Emphasis	Soil Amelioration, Crop Tending, Pest Management, Water Management, Micro-climate
		Methods	As above
4	Documentation	Observations	Different aspects like plant growth, pest, soil development, weeds, climatic factors etc.
		Record Keeping	As above
		Detail Study	As above
		Literature Published	
5	Feedback		

3. Advanced Stage (Interviews and Field Visits)

3.1. Investigation Period

1. Initial Conditions (Startup)
2. Development Stages (Intermediate Stages)
3. Present Status

3.2. Study Areas (for interviews and field visits)

I. Practices and Methods (Main Focus) of Sustainable Cultivation

1. Soil and Nutrient Management
2. Pest Management
3. Weed Management
4. Water Management
5. Crop Management
6. Microclimate Management
7. Physical Protection (fencing) Management
8. Problem Identification-Diagnosis-Planning

II. Social Feasibility

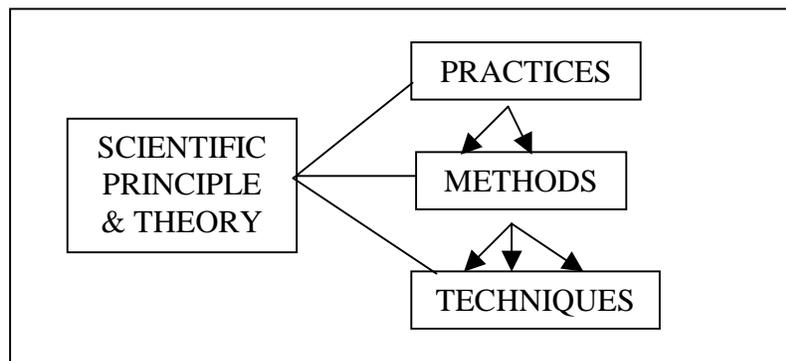
III. Ecological Feasibility

IV. Economic Feasibility

V. Scientific Approach

Annexure VII-B. Survey Preparatory Material (B) Final Output Template (FOT) for the Survey of GISC

- I. Introduction: LEISIC**
 - i. What is LEISIC: Definitions, Criteria (inputs, sustainability, intensity, cultivation vs. Agriculture)
 - ii. Why LEISIC: objectives, context, target group.
- II. Basis of LEISIC**
 - i. Agroecology / LEISA
 - ii. *Prayog Parivar*
- III. Overview of LEISIC Practices**
 - i. Soil and Nutrient Management
 - ii. Crop Management
 - iii. Pest Management
 - iv. Water Management (farm level)
 - v. Weed Management
 - vi. Physical Protection (Fencing) Management
 - vii. Microclimate Management
- IV. Practices - Methods – Techniques of Sustainable Cultivation**
 - i. *Methods*
 - Introduction
 - Origin, Source, People and Organizations Involved
 - Applications
 - Advantages / Disadvantages
 - ii. *Techniques*
 - Processes Involved: Process (sheet), Process Variations (seasons, resource availability, core objectives), Process Monitoring, Process Quality Control, Advantages/Disadvantages
 - Parameters: Input and Output e.g. Labour Requirement, Natural Resource Requirement (biomass, water, climate, rainfall, etc.)
 - Results: Output (quantitative, qualitative), Success Rate, Failure Areas.
- V. Practices and its Scientific Principle/ Theory**
- VI. Problem Areas (Adaptation and Generic), Areas for innovations / improvements / adaptations.**



Annexure VIII-A. Survey Tools
(A) Contact Establishment Letter

àV,

{df` : - emídV eVr CnH\$`nÀ`m`_mfVrMo g\$BZ.

_hmK` ,

AmY{ZH\$ eVrMmgVV dntUam I M,É` nV CX^dUne`mZdZdrZ g_n`m, d`_mJmg g_nOnVrb eVH\$`nMo
~nOmanRalarb dntV oAdb\$-Éd`m gda{H\$`nU`oJar~ eVH\$ar {deFV: X{bV, AmXdngr d`_{hbm^aSyZ {ZKV
AnhohoAnnUng`_nhrVM Anho hoand`É`mgnR\$`H\$_r I MnP`m`nVn{ZH\$ n{agamVrb gnyZnla AmYn{aV, d`{O{H\$D\$
áhUOM "emídV" eVrH\$S\$di É`nMr JaO {Xdg{Xdg dntV Anho`_mì engH\$` d`BVa`_nR`em g\$WnZr emídV
eVrÀ`m {df`nH\$S\$naogobj XÉ`ng AOZ Var gnedmV H\$br Znhr. _mì`ndV:À`m AZn`dmVZ`m {df`nMo`_hÉd
OnUdè`nda AZH\$ eVH\$ar d`g\$Wm-gKQZm`om {df`nda {d{dY`àH\$naMo H\$m`_H\$arV Anhv. om`i`{°\$ d`
g\$WnZr`_oemídV-eVrÀ`m AmYnao`àÉ`j`à`nol d`eVr H\$aUne`_mMo`à`nUhr I yn`nR`a Anho`engH\$` d`_nR`em
g\$WnZr`Mnodbè`m Xlob`m`_i`oñdV:hY`_m {df`nda H\$m`_H\$aUne`m`gdnMo`nolXnZ I yn`_nè`dmZ Anho`_m {XeZ`o
CMbbbo`àÉ`H\$`nD\$bo`_hÉdnMo`RaUma Anho`_mì`_m H\$m`_nMr`i`nár`nnhVm`AnnUm`gdnZm`EH\$`_H\$naMo`à`ÉZ`d`
CnH\$`_g`_OZ`KlJoho`_hÉdnMon{hbonnD\$bo`Anho`É`nV`i`Zo`à`ngZo`emídV`eVrVrb`{d{dY`CnH\$`nÀ`m`_mfVr
g\$BZnMoH\$m`_hmVr`KVbo`Anho`emídV`eVrUmaog`_nOnVrb`d\$MV`KO{H\$Z`em emídV`CnOr{dHoMm`Zdm`_m`_i`ndm
`m`hVZ`oMnbyH\$obè`m`m`H\$m`_nV`Annè`m`gh`^`m`nMr`And`i`H\$Vm`Anho`

"à`ng" g\$Wm`Jbr`Xhm`df`{d{dY`gm`n{OH\$`j`d`nV`H\$m`_eV`Anho`COm`_Ananè` , nrbH\$Éd, Zg{JPS
g\$nyZod`Jm`_rU`CnOr{dH\$m`_m`j`d`nV`g\$WModol`d`o`i`oJ>ñdV\$`nUoH\$m`_H\$arV`Anhv. g\$nyZod`CnOr{dH\$m`_m`
{df`_m`_U`_o`H\$m`_H\$aUne`m`_JO`_Mo`_H\$m`_Jé`_m`XnZ`dfnmgY`Mnby`Anho`'H\$_r`_mø`gnyZnMr`emídV`eVr
(H\$.~mgmemídVeVr) d`É`nUaoH\$H\$UmVrb`AmXdngr`d`Jar~`_{hbn\$`_V`emídV`CnOr{dH\$MognYZ`nrbMdUohm`
`m`_JO`_A`_m`_H\$m`_m`_nrb`EH\$`_hÉdnMm`CÔe`Anho`hm`CÔe`gnU`_H\$aÉ`ngnR\$`à`ngV\`\$`H\$.~mgmemídV`eVrMo`
àÉ`j`XeZ`{S`_n{ñO`eZ},`à`nol,`à`ej`U`Aem`VrZ`gYr`_m`nZo`H\$m`_Mnby`Anho`am`JS`_{OèomVrb`_nUJnd
Vnbs`_nV`à`ngMo`Aä`ng`H\$D`Anho`gnZo`JéOr`am`i`_`ñ`_naH\$,`d\$Ka,>(Vm`_nUJnd)`m`g\$WÀ`_m`ghH\$m`_nZo`
gU`_m`EH\$`EH\$a`Omda`àÉ`j`XeZ`d`à`nol`nMo`H\$m`_Mnby`Anho`H\$T`_I`Vo`AWdm`H\$T`_H\$O`H\$ZmeH\$`Z`dnnaVm`
_`_V: ^`nOrnrbom`d`H\$nr`_`\$i`PnS`_Mr`brndS>Mnby`Anho`_`nM`AZn`dnA`_m`AmYnanda`AmXdngr`d`_{hbn\$`_m`
~ane`a`H\$m`_H\$aUne`m`H\$m`_H\$UmVrb`{d{dY`g\$Wm-gKQZnÀ`_m`H\$m`_PSE`_ngnR\$`à`ej`U`{e-rabr`Mnby`Anhv. `à`ej`U`
{e-ranVZ`V`na`hnbJao`H\$m`_PSE`_nMo`JO>Ann`Annè`_m`H\$m`_j`d`nV`OnD\$Z`emídV`eVrÀ`_m`j`d`nVrb`AnKns`_VnH\$S`_Mo`
H\$m`_~OndVrb`Aer`H\$enZm`Anho`AmXdngr`dnS`_nR`_V`d`_{hbm`JO`_n`_V`emídV`eVrMm`Zdm`g\$e`om`AnKns`
VnH\$S`_m`nrbMdVrb`Agm`Anahr`bom`{d`dng`dnO`_Vno`

`m`nmíd`_y`rda`{d{dY`{R`H\$Ur`Mnby`Agbè`_m`emídV`eVrÀ`_m`CnH\$`_nÀ`_m`_mfVrMo`g\$BZ`H\$aÉ`_nMm`CnH\$`
à`ngÀ`_m`g\$nyZod`CnOr{dH\$m`_JO`_V\`\$`hmVr`KVbo`Anho`_mVZ`nR`_b`CÔe`gnU`_hmVrb`Ago`Anahr`bom`dnO`_Vo`

1. emídV eVr_Ü`oH\$m_ H\$aUmao eVH\$ar ~nYd VgM gñWm-gKQZm`nMr EH\$ AU`ndV`nKr V`na hnbB. È`m_wi`oEH\$_bH\$Ü`ogñK gmYUod AZw`dnMr XdnUKdnU H\$aUoeŠ` hnbB.
2. emídV eVr_Ü`oZi`mZo`à`EZ H\$e BpAN`Uñe`nZm gÜ`m MmbyAgUñe`m {d(dY`à`EZn`Yz CInDZ`{i`b`d È`nZm`wXeZngnR``nZ È`mì`°\$ d gñWñ`g`nmbMÈ`nMm`w`l`b`m hnbB.
3. emídV eVrVrb {d(dY`à`EZn`Vz H\$hr {d(ei>nÜXVr`d`Vj`o`nA`m`ObA`m`r(hVrMogñSobZ`Prñe`ng È`nMm`g`nOmVrb {d(dY`KO`H\$Zm`Cn`w`hnbB. {defV: g`nOmVrb`d\$MV`KO`H\$`ano`a`H\$m_`H\$aUñe`m`H\$ñ`P\$È`nZm È`nMm`{def`\\\$m`Xm`hnbB.

darb CÖe`grÜ`H\$aÈ`ngnR`_r(hVr`gñSobZnA`mAm`À`m`à`EZnMo`I`norb`Q\$nonnSboAnhV`:

1. emídV eVr`À`m`j`d`mV`H\$m_`H\$aUñe`m`gñWm`gKQZm`eVH\$ar`_r(hVJna`Aem`{d(dY`_`\$`i`tn`V`nInUao`AWdmAY`_`wJZonñMz`È`ñMr`EH\$`gñH\$`nKr`V`na`H\$aUo
2. Aem`ì`°\$`d`gñWñ`\\\$`emídV`eVr`À`m`gK`^`nV`H\$e`m`OnUñe`m`gd`^`a`EZnMr`gñj`á`_r(hVr`nInUao`qH\$dm`XpÜdZrUao`AWdmBVa`_`wJZo`Jni`m`H\$aUo
3. H\$hr`Ran`dH\$`CnH\$`nZm`àÈ`j`^`>`XD\$Z`AWdm`nInUao`È`nA`m`H\$m`nMr`VnerbnV`_r(hVr`Jni`m`H\$aUo`_`m`CnH\$_`Ü`o`AmboghH\$ñ`^`bn`b`Aer`Anem`Anho`AnnU`ñdV: qH\$dm`AnnUng`_r(hV`Agbe`m`BVa`gñWm-gKQZm`AWdm`eVH\$ar`emídV`eVr`_`m`{df`mV`àÈ`j`H\$m_`H\$arV`Agè`ng`È`ñMr`_r(hVr`AnnU`Anahñom`nñR`elndr`Aer`{dZy`r`H\$aÈ`ngnR``honI`{bhrbo`Anho

AnnU`nñR`{d`be`m`_r(hVrMm`dñna`Am`À`nH\$S`Z`i`mñnar`H\$m`ngnR``Höbom`OnUra`Zñhr. O`Unar`gnar`_r(hVr`gdñZm`{d(dY`_`wJZr`_`P\$ñUo`Cnb`ä`Y`H\$e`Z`{Xbr`OnB. VgM`_`m`_r(hVrMm`dñna`H\$aVñZm`{CXm`à`H\$ñ`eV`ñdénñV,`à`{ej`Um`Ü`j`d`o`nol`r`Annè`m`ZndñMm`C,,`d`Höbom`OnB`_`nMr`Xj`Vm`Anahr`Z`,\$\$M`KD\$.`_`m`_r(hVrgñSobZnVz`emídV`eVr`À`m`j`d`m`Ü`o`H\$m_`H\$aUñe`m`_`\$`i`r`ZngÖm`EH\$`I``È`ñMr,`nañnar`er`gñK`gmYÈ`ñMr`d`EH\$`bH\$Zm`^`Oz`H\$m`nMr`nñ`sb`{Xem`Ra`{dÈ`ñMr`gYr`{i`ye`Höb. _`ñI`_`ngnR``AmboghH\$ñ`^`And`i`H\$`Anho`_`ngnR``H\$ñ`m`nIn`gñe`V`On`Sbe`m`nñO`H\$S`a`a`Ambo`Zñd,`nInm`d`gñH\$ñ`gnR``\\\$nZ`Z\$a`{bhZ`Anahng`naV`nñR`elndo`AnnUng`_r(hV`Agbe`m`BVa`gñWm-gKQZm`AWdm`eVH\$ar`emídV`eVr`_`m`{df`mV`àÈ`j`H\$m_`H\$arV`Agè`ng`È`ñMo`Zñd`d`nInm`gÖm`nñO`H\$S`a`a`o`nñR`elndo`Ambo`nñO`H\$S`a`a`{i`VñM`Anahr`AnnUng`n`{hè`m`XñZ`Q\$B`nVrb`_r(hVrgñR``(^`aÈ`ng`gnb`m`Aem)``à`Zndè`m`nñR`ely`hr`_r(hVr`gñj`á`ñdénñMr`Agb. È`m_wi`o`à`i`Zndbr`^`aÈ`ng`\\\$na`dö`bnw`Una`Zñhr`_`nMr`Anahr`Xj`Vm`KVbr`Anho`Varhr`H\$ñ`m`gñe`V`MonñO`H\$S`a`a`bdH\$anV`bdHa`Anahng`nñR`elndohr`{dZy`r.

Y`d`dnX.

(g_Yd`H\$,`gñmV`Zod`CnOr`{dH\$m`CnJQ)

Annexure VIII-B. Survey Tools
(B) Questionnaire No. 1- Contact Data

Question 1. Please provide contact information in the following chart of the people from your locality who are engaged in sustainable cultivation

Question 2. Also please mention in short the most important characteristic feature of the sustainable cultivation practices followed by them.

Contact No. 1

1. Name of contact person:	Organisation Name:
Address for correspondence:	
Phone/fax:	Email:
Farm Address: (including phone number)	
2. Most important characteristic feature of the sustainable cultivation practices followed:	

Contact No. 2

1. Name of contact person:	Organisation Name:
Address for correspondence:	
Phone/fax:	Email:
Farm Address: (including phone number)	
2. Most important characteristic feature of the sustainable cultivation practices followed:	

Annexure VIII-C. Survey Tools

(C) Guidelines for filling the Questionnaires

1. The 'Contact Data Questionnaire 1' is meant for the preparation of a contact list of people engaged in Sustainable Agriculture. This list can comprise of the names and addresses of the persons, agricultural institutions and grassroots organizations that are involved in the field of Sustainable Agriculture from your region/area.

2. Please use the following listed indicators to decide whether a particular type of cultivation falls under the category of Sustainable Agriculture. The indicators are as follows:

- Maximum use of biomass (e.g. grass, leaves, animal excreta, crop residues) for improving soil fertility.
- Zero or negligible use of artificially synthesized chemical fertilizer.
- Use of different techniques to reduce the water requirement.
- Maintenance and enhancement of diversity of flora and fauna in the farm as well as in the soil.
- Use of natural pest and disease control measure.
- Zero or negligible use of artificially synthesized chemical pesticides.
- Use of cropping pattern and soil tillage techniques that conserve soil and control disease and pests naturally (e.g. mixed cropping or use of conservation tillage).
- Conservation, propagation and use of local seeds.
- Development of any new method of reducing the total expenditure on agriculture, which may be vital from the point of view of the resource poor people.
- Maximum use of tools, equipments and other inputs that are locally available to the poor farmers.

3. In questionnaire no.1 along with the contact information also provide the important characteristic feature of the sustainable cultivation practice followed by the particular person listed. Such information should provide a brief introduction to the type of sustainable cultivation practiced by the listed contact person (e.g. the information could be like this - 'in this cultivation method local seeds are cultivated that can be grown even in water stress conditions or in this cultivation method no artificially synthesized fertilizers, pesticides are used').

4. Profile questionnaire no.2 is aimed at creating a brief profile of the type of sustainable cultivation practiced by you. We kindly request you to answer all the questions. If you are not able to provide information on some of the questions due to some reason please mention accordingly at the place given for writing the answer.

5. You can also make copies of the blank questionnaire and pass the same to other sustainable cultivators.

6. If you are not able to provide any information please return us the questionnaire through the self-addressed envelop or pass the same to others who may be interested in providing relevant information.

If you have any doubts regarding the questionnaires or you need some information please feel free to contact us at the following address: **Prayas-Resources and Livelihood Group, Mangeshpushp, Survey no.133, Swami Vivekananda Society, Near BAIF, Waraje, Pune-411052, Ph.-020-25232836, Fax-020-25673118, E-mail-reli@vsnl.net .**

**Annexure VIII-D. Survey Tools
(D) Questionnaire No. 2- Profile Data**

Contact Information

1. Contact Person:

2. Organization Name:

3. Address:

4. Tel. No.:

5. E- mail:

B. Type Of Sustainable Cultivation

6. Objectives of your Sustainable Cultivation?

Self-Consumption

Food production for market

Research

Demonstration of Sustainable

Cultivation for Public Awareness

Training and Education on Sustainable Cultivation

Other.....

7. If you are involved in Research, Public awareness or Education program, which type of farmers / community you are working for?

Landless

Small farmers

Medium farmers

Big farmers

Women

Tribals

Nomadic Tribes

Other

8. Which type of equipments and tools do you use in your sustainable cultivation?

Tractor

Bullock cart

Water pump

Drip irrigation

Jerry can

Chaff cutter

Other

9. What type of soil tillage do you follow in your sustainable cultivation?

Tillage by Tractor driven Plough

Tillage by Bullock driven Plough

Tillage by Spade

Soil Scrapping

Zero Tillage

Other

10. What type of fertilizers do you apply to increase soil productivity?

Only Artificial / Chemical fertilizers

Only Organic manure

Judicious combination of both Organic and Chemical fertilizers

11. What type of Pesticides (or pest management measures) do you apply to control plant pests /diseases?

- Only Artificial / Chemical Pesticides Only Organic Pesticides / Natural Pest Control Measures
- Judicious combination of both Organic and Chemical Pesticides

12. What are the major crops that you cultivate using sustainable cultivation practices?

- Cereals [Rice, Wheat, Pearl millet, Great millet sorghum, Maize, Finger millet, etc.]
- Pulses [Pigeon pea, Green gram, Kidney bean etc.]
- Vegetables [Lady's finger, Cluster bean, Pumpkin etc.]
- Oil seeds [Groundnut, Sunflower etc.]
- Fruit Trees Cash crops [Sugar cane, Cotton etc.]
- Other:

13. How much land area [sq.ft./ acre] is under sustainable cultivation ?

14. Since how many years are you practicing sustainable cultivation?

15. In which seasons do you cultivate your land?

- Rainy Winter Summer

C. Achievements and results of Sustainable Cultivation

16. What type of achievements / results have you achieved till date? [Note: You can tick more than one answer.]

- Experiential Knowledge of Sustainable Cultivation Conviction about benefits of Sustainable Cultivation Cost Reduction in Crop Production Record Yield in Crop Production
- Increased Soil Productivity Preparation for Improved Yield in future
- Research on Improved Techniques in Sustainable Cultivation
- Study / literature development on Sustainable Cultivation Practices
- Other:

17. How many years have you spent/ will require to achieve increased/ satisfactory yield levels ?

..... years spent to achieve increased/ satisfactory yield levels

Or years will require to achieve increased/ satisfactory yield levels

18. Please give information on maximum crop yield achieved by you in the following table:

No.	Season & Year	Crop Name	Yield Levels (Record/ Moderate/ Lower)	Area (sq. ft. or Acre)	Yield in (Kilogram)

D. Methods of Sustainable Cultivation

19. Which of the following aspects of Sustainable Cultivation do you manage in your farm?

- Soil Management Crop Management Pest/ Disease Control Water Management
- Live Fencing and Microclimate Creation
- Other

20. In which of the above listed aspects, have you gained expertise or are operating with highest efficacy?

- Soil Management Crop Management Pest/ Disease Control
- Water Management Live Fencing and Microclimate Creation
- Other

21. What are the methods do you employ in the management of above listed aspects?
[Give brief information about methods in following chart or enclose supplements.]

Methods of Sustainable Cultivation
1. Soil Management:
2. Crop Management [e.g. Sowing Method, Crop Rotational, Pruning Methods, Intercropping etc.]:

3. Pest / Disease Control:
4. Water Management:
5. Live Fencing and Microclimate Creation:
6. Other:

22. Can you provide detailed information on above-mentioned methods?

- Yes No

23. If yes, please send your information as per enclosed chart titled “Sustainable Cultivation Practices: Detail Information Chart”.

E. Observations and Documentation of Sustainable Cultivation

24. Which natural aspects in your farmyard do you regularly observe?

- Crop Growth Crop Pest and Disease Soil Quality (soil fertility and soil life)
 Weeds Insects, Birds, Animals in farm
 Daily Weather (Sun light, Wind, Humidity, Rainfall etc.)
 Other

25. For which of the following aspects do you maintain regular record and data?

- Time Required for particular Work Cost Incurred Yield Values and Productivity
 Documentation of Method and Process Resources and Inputs required (eg. Cow dung, Cow urine, Ash etc.)
 Water Input Organic Matter/ biomass Crop Growth rate Biomass from crops residue
 Weather (Rainfall, Sunlight, Wind etc.) Harmful pests/ diseases and
 Other

26. Of the various subjects of Sustainable Cultivation, which are subjects you are studying in detail?

- Soil Specific crops (Which?)
- Crop Diseases/ Pests Microclimate Cropping System (Which?)
- Other

27. Have you published any literature regarding Sustainable Cultivation? If yes, what and where?

F. Feedback on the Present Sustainable Cultivation Documentation Activity

28. Do you think that information regarding various types of experiments and efforts in sustainable cultivation at various places should be documented?

- Yes No

29. In which manner the documented information should be published?

30. Would you like to share more information regarding Sustainable Cultivation?

- Yes No

31. If yes, to whom we shall contact regarding personal visit and interview at your farm/place?

32. What you fill regarding this questionnaire and documentation activity program?

Sustainable Cultivation Methods: Information Chart

1. Method:
2. Objectives of the method:
3. Important inputs/ resources and its Quantity:
4. Steps and process in the method:
5. Precautions:

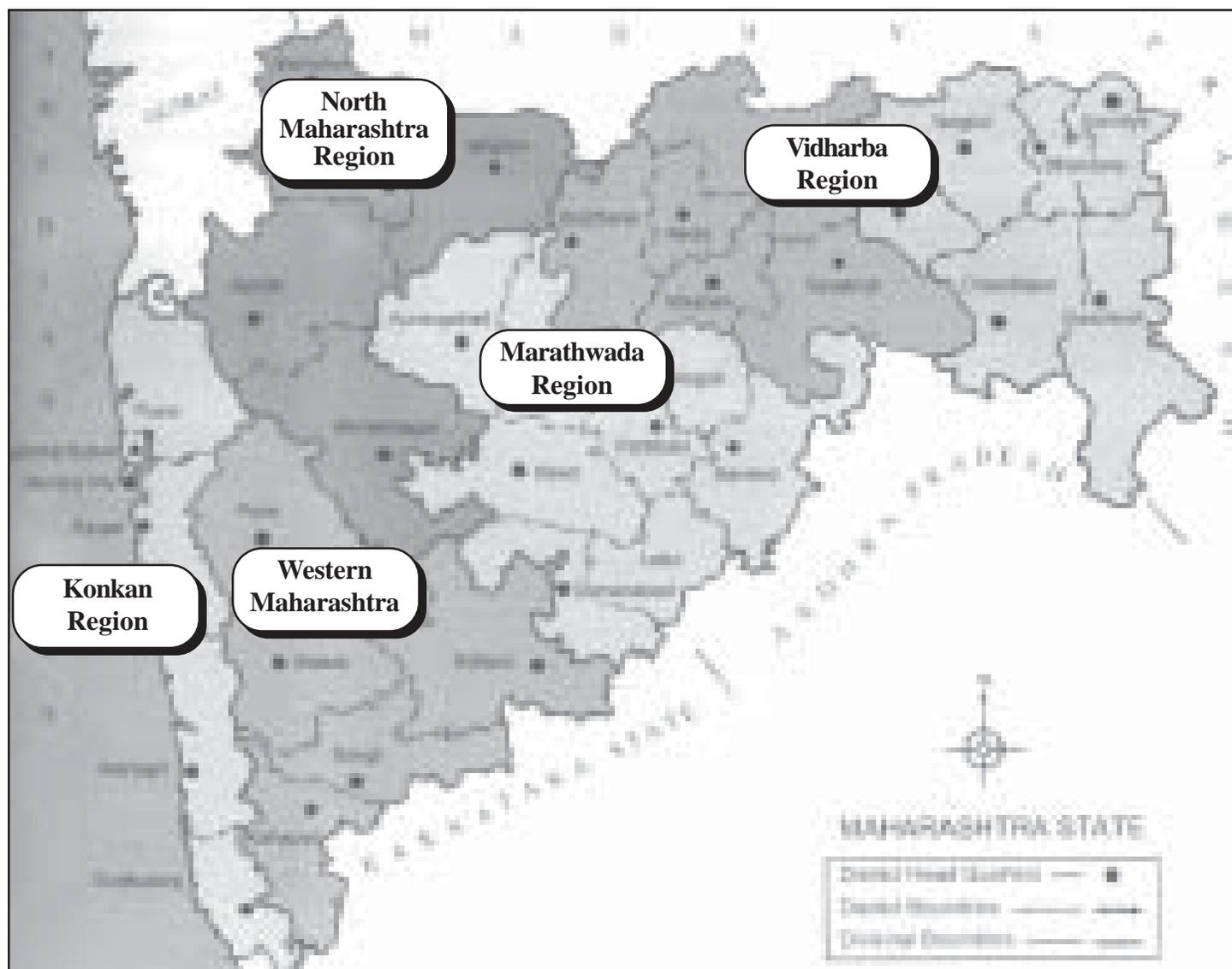
Annexure VIII-E. Survey Tools: (E) Practices Documentation- Technique Chart

Practices Checklist: 1. Soil & Nutrient Management, 2. Pest Management, 3. Weed Management, 4. Water Management, 5. Crop Management, 6. Microclimate Management, 7. Fencing Management, 8. Problem Identification-Diagnosis-Planning. **Name of the GISC:**

Information Heads	Details
1. Process	
Objective, Inputs, Steps	
2. Application	
3. Results	
Indicators, Impact on Yield	
4. Parameters	
Input: Labor, Biomass, Money, Equipment/ Tools, Water, Other (Quantity, Type, Quality)	
Output: Time required, resultant output, yield difference, monetary returns,	
5. Limitations/ Constraints	
Input Availability (Labour, Biomass, Money, Equipment/ Tools, Water), Time for results/ Gestation Period, Monetary Cost, Results / Impact Intensity	
6. Probable Variations	
Seasonal, Impact / Output Level, Expediting, Input Constraints	
7. Criticalities / Vulnerabilities / Error Spots (Step wise, quantity, quality)	

Annexure IX : Map of the Survey Area

(please open the Pagemaker zip file named 'Annexure IX_Map of Survey Area' enclosed in the folder)



Bibliography

1. "The Organic Farming Source Book", 1999, The Other India Press, Goa.
2. Subhash Palekar, 2000, "*Naisargik Sheti: Kalachi Garaj*", Prachin (Vaidik) Krushi Tantra Shodh, Vikas Awam Prasar Pratishthan, Amrawati, Maharashtra.
3. Shivnarayan Adhav, 2003. "*Shashwat Sheti*", Nagpur.
4. "*Shashwat Sheti*", 1999, AFARM, Pune, Maharashtra.
5. Reddy Yellamanda T. et al., 1997. "Principles of Agronomy," Kalyani Publishers. Ludhiana.
6. Reijntjes Coen et. al., 1992, "Farming For The Future: An Introduction to Low-External-Input and Sustainable Agriculture", ILEIA, Netherlands.
7. Gaur A. C., et al, 1984. "Organic Manures," ICAR. New Delhi
8. Yawalkar K.S., et al. 2002. "Manures and Fertilizers," Agri-Horticulture Publishing House. Nagpur.
9. Brady Nyle. C. 1999. "The Nature and Properties of Soils". Prentice-Hall of India. New Delhi.
10. Miller Raymond W., Roy L. Donahue. 1997. "Soils In Our Environment". Prentice-Hall of India. New Delhi.
11. Inckel Madeleine et al., 1990. 'The Preparation And Use OF Compost,' Agrodok 8. Agromisa. Netherlands.
12. Brandjes Pieter et al., 1989. "Green Manuring And Other Forms OF Soil Improvement In The Tropics". Agrodok 28. Agromisa. Netherlands.
13. Talashilkar Suresh C. 1998. "*Shaswat Shetisathi Sendriya Khate*". Sun Publications. Pune.
14. Chatterjee B. N. et al., 1989. "Cropping System: Theory and Practice", Oxford & IBH Publishing Co. New Delhi.
15. Suresh R., 1997. "Soil and Water Conservation Engineering", Standard Publishing Distributors. Delhi.
16. Allaby Michael, 1998. "Dictionary of Ecology", Oxford, New York.
17. Srivastava K. P., 1996. "Textbook of Applied Entomology" Volume 1 and 2, Kalyani Publishers, Ludhiana.
18. "Handbook Of Agriculture", 1980, Indian Council of Agriculture Research, New Delhi.

* * *