

Pre-Proposal Application

General Information

Name of the Applicant: Niranjan Ram Toradmal

Designation: Scientific Officer (Bamboo Craft & Livelihoods)

Qualifications (*with specialization*):

Bachelor of Engineering (Mechanical)

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Name of the applicant Institution/ University/ Organization (*with contact details*):

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Relevant research experience of the Applicant/ Institution (*in brief*):

- 1) Developed an exoskeleton named 'Bharwahak' for assisting porters in manual load carrying.
- 2) Designed and manufactured all-terrain vehicle to participate in 'Baja SAE India 2012'.
Applicant was part of transmission team.
- 3) Developed regenerative breaking system for bicycle.

1. Project Title

Development of mechanized wheeled trolley for seed sowing process in Saguna Rice Technique

2. Nature of Projects (refer to the scheme document)

Location specific research and innovative technology development: Identify and formulate projects linked to specific local needs, material resources, skills and potential for development with S&T inputs/applications.

3. Project Site:

- i) Model Production Unit, STRC-GUG, Gadchiroli (For Development)
- ii) Agricultural land, Nimgaon, Dhanora, Gadchiroli (For Field Test)

4. Problem Statement

To design, manufacture, test and standardize a wheel based trolley with following functions and abilities:

Functions to be performed:

- i) To create holes in soil at specific distance on 1 meter wide soil bed
- ii) To put seed, fertilizer and water in created hole accurately

Expected abilities:

- i) It must be able to work on moist soil in the fields
- ii) It must be able to carry required stock of seed, fertilizers and water
- iii) It must be low maintenance and easy to use machine
- iv) It must work on human power without any external power support

5. Rationale / Background

Traditional rice cultivation practices include ploughing, puddling and transplanting of seedlings from nursery to the actual farm. To avoid this tedious method of rice cultivation Saguna Rice Technique (SRT) is developed that allows farmers to cultivate rice with minimal efforts. In this method rice is planted on raised beds having width 1 meter and keeping specific distance between two plants i.e. 25 cm x 25 cm. To achieve desired spacing between rice plants, marking is done using specially designed iron frame. After preparation of beds this iron frame is imposed on bed to create holes at specific distance and seed and fertilizer is put manually in those holes. This process requires additional human resource and involves frequent bending. It is also observed that in case of delayed rainfall, percentage of germination reduces as seed and fertiliser doesn't get necessary water and moisture in initial stage of germination.

Even though SRT is better than traditional methods, there is scope for mechanization of holes creation process. Seed and fertilizer can also be put automatically and we can add water with it to increase chances of germination. Scope of proposed project is to develop a machine to realise possibility of above mentioned improvements in current practices in SRT.

6. Objectives

Broad Objective of this project is to reduce human drudgery involved in manual seed sowing process and to improve quality and efficiency of seed sowing.

Specific objectives are:

- i) To reduce back pain caused by frequent bending involved in current seed sowing process.
- ii) To overcome manual errors in current hole creation process and improve its speed through appropriate mechanization.
- iii) Improve chances of germination by providing some quantity of water at the time of sowing.

7. Proposed Outcomes

- i) Seed sowing process in SRT will get atomised.
- ii) Human drudgery will be reduced and quality of farming will also increase.
- iii) Results of this project will provide platform for further development of wheeled trolley based weed cutter and harvester.
- iv) It will be one more step in the direction of standardizing agricultural practices as SRT itself is the initial step in that direction.

8. Relevance to STRC mandate

STRC is mandated to study technological needs in Gadchiroli region and develop or borrow appropriate technology to fulfil those technological needs.

Rice cultivation is common practice in Gadchiroli therefore STRC is mandated to support development of technologies to solve problems in rice cultivation.

9. Scale of potential

- Rice cultivation is practiced on 45 million Hector land in India i.e. about one quarter of total agricultural land. Successful development of the proposed machine can lead to improvement in agricultural practices over such large area.
- Same machine with some attachments can be developed to perform more operations like weed removing and harvesting.
- With suitable modifications similar machine can be developed for plants other than rice.

10. S & T Components

- Science and Technology is very core part of this project. Development of this machine will require scientific knowledge of all components of rice cultivation including soil, seed, fertilizers, germination process etc.
- It will also require in depth knowledge of various machine design and manufacturing processes. Therefore Agro Sciences and Mechanical engineering are S & T components in this project.

11. Methodologies

Following procedure will be followed to conduct implementation of this project

Steps	Work to be done	Methodology	Duration
1	Detailed study of seed sowing process in SRT	Study visits will be done to farmers using SRT method and literature survey on SRT will be done	15 Days

2	Design mechanisms to meet above mentioned objectives	Complete machine will be designed following standard machine design guidelines using advanced software	15 Days
3	Manufacture the designed machine	Manufacturing will be done in Model Production Unit using basic and advanced mechanical machines with quality control	45 Days
4	Conduct rigours field test	Field tests will be conducted with SRT users in Nimgaon and other villages in Dhanora block.	30 Days
5	Make necessary modifications as per field test results	Design will be modified as per feedback from field test	15 Days
6	Standardize design for large scale use	Design will be further modified to suit large scale implementation of this machine	30 Days

Total project duration: 5 Months

12. Approximate Budget: INR

Sr. No.	Particulars / Items	Total Cost
1.	Raw materials	30,000/-
2.	Manufacturing	40,000/-
	Field visits and field testing	10,000/-
	Miscellaneous	10,000/-
Grand Total		INR 90,000 /-