TERMS OF REFERENCE FOR THE R&D PROJECT

Food and Agriculture Department

Agricultural Machinery and Equipment Sectional Committee, FAD 11

1 Title of the Project

Study on Performance and Safety Requirements of Pneumatic Planter

2 Background

A pneumatic planter is a type of agricultural machinery used for planting seeds in rows with precision and efficiency maintaining equal row to and plant to plant spacing. Unlike traditional planters which rely on mechanical devices, pneumatic planters utilize compressed air to handle the seed delivery and planting process. These planters are commonly used in modern farming practices to achieve uniform seed spacing and depth, optimizing crop growth and yield.

Pneumatic planters are part of the broader trend in precision agriculture, where technology is applied to enhance the efficiency and accuracy of farming operations. These planters are suitable for a variety of seeds of different sizes, including cotton, corn, soybeans, and other row crops. The adoption of pneumatic planting technology aligns with the goal of maximizing crop yield while minimizing input costs and environmental impact.

With fast development in farm mechanization, pneumatic planters are increasingly being manufactured and used in the country. Currently, pneumatic planters are being tested at different testing centers [Farm Machinery Training and Testing Institutes (FMTTIs) and recognized Institutions by Department of Agriculture and Farmers Welfare, Ministry of Agriculture and farmers Welfare, Government of India] based on codes developed by them. However, due to unavailability of any standard for performance and safety requirements, there no check on the quality of Pneumatic Planter being produced in India and those imported. Therefore, the subject has been taken up as new work item by the Agricultural Machinery and Equipment Sectional Committee, FAD 11 for development of the standard. In this regard, it has been decided to take up a research project to study performance and safety requirements of pneumatic planter.

3 Objective

To study the performance, safety requirements and operational aspects of Pneumatic Planter to develop a Test Code and Minimum Performance Standard for usage at the Testing Centres.

4 Scope

4.1 Thorough review of the available literature on Pneumatic Planter, including but not restricted to the following and provide comparative analysis:

a) International and National testing guidelines;

b) Regulatory stipulations;

c) Research publications;
d) National import export data;
e) National infrastructure for manufacturing; and
f) Any other sources.

4.2 Identification of manufacturing base of Pneumatic Planter (tractor operated) in India along with categorization of large and MSME scale industries. To identify and assess the existing technologies and innovations in pneumatic planter, with a focus on performance and safety related features. Collection of data on the performance, efficiency, and operational characteristics of various pneumatic planter models available in the Indian market. Industry visit to study manufacturing process of Pneumatic Planter. Interaction with the technical personnel and taking their feedback on operation, maintenance, safety and performance of Pneumatic Planter. Study on sustainability aspects of the Pneumatic Planter being manufactured such as its environmental impact, energy conservation, etc. Prepare a questionnaire for this purpose.

4.3 Identification and interaction with testing centres i.e., various Farm Machinery Training and Testing Institutes and State Agricultural University's/Institutions authorized for testing of Pneumatic Planters. Collection and study of Test methods being followed and test reports issued.

4.4 Identification and interaction with research and academic institutions working on Pneumatic Planter for collecting research-based evidence for better understanding the working of Pneumatic Planter.

4.5 Identification of farmer base using Pneumatic Planter. Focused Group Discussions with the farmers and taking their feedback on operation, maintenance, safety and performance of Pneumatic Planter. Prepare a questionnaire for this purpose.

5 Research Methodology:

5.1 Undertake thorough literature review as per **4.1** and prepare summary report including comparative analysis.

5.2 Identify manufacturing base categorized into large, medium, small, and micro. Contact the manufacturers and collect information using a structured questionnaire. Inform them about requirement of industry visit and collection of shareable data.

5.3 Identify exporters and importers of Pneumatic Planter. Contact them and collect information using a structured questionnaire,

5.4 Undertake visit to identified manufacturing units (4 large and 3 MSME) and Testing Centres (At least 7 testing centres where pneumatic planter are being tested shall be visited).

NOTES
1 In case large manufacturers are not there, at least 5 MSMEs shall be visited.
2 Testing centres identified for visit must include at least 2 FMTTIs where pneumatic planters are being tested.

5.5 Following activities shall be carried out and a report shall be prepared:

The primary survey should focus on the following aspects:

i. *Definition of Pneumatic Planter including various components of it.*
ii. *Applicable Regulatory and Statutory requirements.*
iii. *Any other stipulation w.r.t. manufacturing of Pneumatic Planter.*
iv. *Performance criteria for the evaluation of Pneumatic Planter including (but not limited to):*
    a. *Assessment of improvements/ advancement over the different kinds of Pneumatic Planters (Manual drawn, Animal drawn, Tractor Operated)*
    b. *Extent of compliance to the existing regulatory guidelines*
    c. *Different types/variants and models of Pneumatic Planters for the purpose of testing and certification.*
    d. *Information on different performance and safety parameters based on tests being conducted by testing centres.*

    NOTE — The performance and safety parameters may include raw material requirement for different components of pneumatic planter, details of important dimensions, Seed Metering Mechanism efficiency, Air Distribution System, Damage Percentage, , Planting speed, Planting efficiency and precision, maintenance requirements *etc).* However the, proposer has to take a note of all the parameters being tested at testing centres.

    NOTE — The proposer should collect test reports issued by the Testing Centres. At least 10% of the total test reports issued by the testing centres in last 3 operational years (during which testing is conducted) should be collected. However, if this percentage yields a count lower than 10 reports, the proposer is obligated to collect a minimum of 10 reports, irrespective of the percentage and stipulated time frame.

v. *Review during the site visit to Testing Centre (Observe the complete process and testing of Pneumatic Planter)*
vi. *Effectiveness of the Pneumatic Planter –*
vii. *a) Extent to which it is economical as compared to broadcasting and seed drill.*
b) Improvement in yield and saving of seeds when seeds are sown by pneumatic planter in place of broadcasting method or seed drill.
c) Sustainability aspects addressed through Pneumatic Planter.
d) *Examination of technological features: Automation, precision farming capabilities, safety features, and any other advanced functionalities.*
viii. *Compliance to any guidelines issued by Ministry of Agriculture.*
ix. *Challenges faced.*

Any other important issue to be shared by the proposer.

5.6 Collation of information and data collected from various sources.

5.7 Comparative analysis of the Pneumatic Planter designed and developed by different industries based on date collected during primary and secondary survey.

6 Expected Deliverables:

Detailed project report of the work done, in hard copy and digital formats, as per the scope specified under 4, with the following as appendices:

a) Research findings and data collected through the secondary as well as primary study including focus group discussions.
b) Primary research findings from industries involved in manufacturing Pneumatic Planter, testing centres testing Pneumatic Planter, research and academic institutions working on Pneumatic Planter as per criteria mentioned under **5.5**.
c) Sustainability report of the Pneumatic Planter after life cycle approach analysis.
d) Engineering drawings/layout for various structures/ designs of Pneumatic Planter in the report.
e) Comparative analysis report of Pneumatic Planter designed and developed by different industries and imported in India

7 Timeline and Method of Progress Review

a) Timeline for the project is 6 months from the date of award of the project.
b) The different stages of review along with its timeline is given as follows:

Stage	**Timeline**
Stage I : Review of the literatures and existing stipulations, identification of key stakeholders in different parts of India, conduct of Focused Group Discussions with various stakeholders working in this field including farmers.	First 2 Months
Submission of Progress Report	End of 2nd Month
Stage II : Primary research findings from Industries/Testing Centres/ Research and Academic institutions working/involved in manufacturing, testing and research on Pneumatic Planter.	3rd to 5th Month
Submission of interim report to Sectional Committee	End of 4th Month
Stage III : Draft report submission – Sectional Committee will evaluate the draft report and provide feedback/recommend changes, if required.	End of 5th Month

At the end of 6th month, project allottee to submit final project report incorporating recommendations/feedback of Committee.

***Note**: The timelines given above are indicative and calculation of time will start from the date of award of sanction letter for the project to the Project leader.*

8 Support from BIS

a. Access to Indian and International Standards

b. Letters from BIS to concerned stakeholders for support in research project.

9 Nodal Officer

Shri Vikrant Chauhan, Scientist-B/ Assistant Director, FAD, BIS may be contacted at fad11@bis.gov.in for any queries on the research project.