



*The implementation of the research project on
"Standardizing Drone Spraying Protocols" at
MPKV, Rahuri.*

Implementation for the period 2023-24



MAHATMA PHULE KRISHI VIDYAPEETH
RAHURI, DISTRICT : AHMEDNAGAR
(MAHARASHTRA)

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Univ. Reso.No.MTG- 3(743)/18 /of 2024,

Date: 20/6/2024.

Read :-

1. Memorandum of Understanding (MOU)
2. Subject No. 33 (19) (Resolution No.47/340 (21.09.2023) approved by the 340th Executive Council meeting held on 21.09.2023

Grant in agreement signing between Fowler Westrup (India) Private Ltd, Plot No. 60-63, KIADB Industrial Area, IV Phase, Malur – 563130, Kolar Dist., Karnataka, India and Mahatma Phule Krishi Vidyapeeth, Rahuri on 12.06.2023 vide referred at Sr. No. 1. The purpose of this agreement is implementing the project on, "Standardizing Drone Spraying Protocols" at Mahatma Phule Krishi Vidyapeeth, Rahuri for the period of 2023-24. To enable MPKV and Fowler Westrup (India) Private Ltd. to undertake research activities to standardize spraying protocols for various chemicals, fertilizers, pesticides, nutrients etc., with use of drones for select crops namely (Sugarcane, Chickpea, Soybean, Pigeonpea and Wheat) including selection of drone spraying accessories; and to validate above activities through field experiments at MPKV farms. The scope of work under this agreement are:-

- Standardizing dosages, mixing proportions and required chemical formulations (fertilizer, insecticides, pesticides, nutrients etc..) for select crop of **Soybean, Pigeonpea, Wheat, Chickpea and Sugarcane**
- Spray dynamics including nozzles, droplet size, drift test/dispersal of spray fluid; and assessing uniformity of spraying and phytotoxicity, if any
- Comparing drone spraying in comparison to conventional spraying including savings of water and chemicals
- Assessing the feasibility of drones for granule and dusting

Accordingly, the proposal for implementation of project on "Standardizing Drone Spraying Protocols" at MPKV, Rahuri was placed before the Hon. Executive Council in its 340th meeting for approval and subsequently approved by the Hon. Executive Council, MPKV, Rahuri vide referred at Sr. No.2.



RESOLUTION

The project on “Standardizing Drone Spraying Protocols” at Mahatma Phule Krishi Vidyapeeth, Rahuri for the period of 2023-24 (one year). The maximum budget approved for the Project under this agreement is Rs. 19.80 lakh (Rupees Nineteen lakh eighty thousand only) for the duration of one year is shown in *Annexure-I*. As per the approved and agreed budget the grants will be provided by Fowler Westrup (India) Private Ltd, Plot No. 60-63, KIADB Industrial Area, IV Phase, Malur-563130, Kolar Dist., Karnataka, India and the research trials will be conducted on the research farm by MPKV, Rahuri. The detail technical programme is shown in *Annexure-II*. The details of the human resources required to carry out the project are shown in *Annexure-III*.

Dr. S. M. Nalawade, Farm Machinery and Power Engineering, Dr. ASCAET, and Dr. U.S. Surve, Professor of Agronomy, PGI, MPKV, Rahuri will work as Principal Investigator for this project and Dr. S. A. Kadam, Associate Professor (IDE), Department of Agril. Engineering, Dr. Y.G. Saindane, Assistant Professor of Entomology, PGI, and Dr. N. A. Musmade, Assistant Professor of Plant Pathology, PGI, MPKV Rahuri will work as Co-Principal Investigators. Technical and Administrative Control shall rest with Head, Department of Agril. Engineering, MPKV, Rahuri. The Assistant Registrar Dr. Annasaheb Shinde College of Agriculture Engineering & Technology, MPKV, Rahuri will be Drawing and Disbursing Officer (DDO) of this project. Overall control of the project shall rest with the Director of Research, MPKV, Rahuri.

This resolution is issued in concurrence of the Comptroller vide his un-official reference No. Cr. 205 VC, dated: 16/05/2024.

Sd/-
Registrar
MPKV, Rahuri

F.W.Cs. for information and necessary action to

- 1) Under Secretary, Agriculture, Animal Husbandry, Dairy Development and Fisheries Department, Mantralay, Mumbai – 400 032.
- 2) The Director (Research), MCAER.132/B. Bhamburda, Bhosalenagar, Pune 411 007
- 3) The Director of Research, MPKV, Rahuri.
- 4) The Director of Extension Education, MPKV, Rahuri
- 5) The Dean, Faculty of Agriculture & Director of Instruction, MPKV, Rahuri
- 6) The Associate Dean (All), MPKV, Rahuri
- 7) The Associate Director of Research, MPKV, Rahuri
- 8) The Head Departments (All), MPKV, Rahuri
- 9) The Comptroller, MPKV, Rahuri
- 10) The Planning Officer, MPKV, Rahuri
- 11) The Deputy Registrar (Admn/ACD), MPKV, Rahuri
- 12) The Asstt. Comptroller (II/III/IV)/PAO, MPKV, Rahuri
- 13) Dr. S. M. Nalawade, Principal Investigator Farm Machinery and Power Engineering, Dr. ASCAET, MPKV, Rahuri
- 14) Dr. U.S. Surve, Principal Investigator Professor of Agronomy, PGI, MPKV, Rahuri



- 15) Dr. S. A. Kadam, Co-Principal Associate Professor (IDE), Department of Agril. Engineering, MPKV, Rahuri
- 16) Dr. Y.G. Saindane, Co-Principal Assistant Professor of Entomology, PGI, MPKV, Rahuri
- 17) Dr. N. A. Musmade, Co-Principal Assistant Professor of Plant Pathology, PGI, MPKV Rahuri
- 18) The Assistant Registrar Dr. Annasaheb Shinde College of Agriculture Engineering & Technology, MPKV, Rahuri
- 19) The PA to Hon. Vice Chancellor, MPK V, Rahuri


Deputy Registrar (Admin.)
MPKV, Rahuri



Annexure-I Budget Provision

Sl. No.	Activities	Budget (Rs. in Lakhs)
1.	Manpower 1. Young professionals 2 No. (FMPE and Plant Protection) @35000/- for 11 months 2. Field Assistant 2 No. @15000/- for 11 months	11 x 35000x2= 7.70 11x 15000 x 2= 3.30 Total= 11.0
2.	Consumables (Drone/spraying system repairs and maintenance, drone spares, etc)	Total=3.0
3.	Contingencies (Field Experimentation along with chemicals used for spraying) Soybean (<i>Kharif</i> 2023) Pigeonpea (<i>Kharif</i> , 2023) Wheat (<i>Rabi</i> , 2023-24) Chickpea (<i>Rabi</i> , 2023-24) Sugarcane (<i>Suru</i> , 2024) Total	0.65 0.65 0.60 0.60 1.50 Total=4.0
		18.0
	Overhead charges (10 %) approx.	1.8
	Total	19.80


Deputy Registrar (Admn.)
MPKV Rahuri



Annexure-II
Technical Programme
Project on 'Standardizing Drone spraying protocols for various inputs in select field crops'

1.	Title of the scheme	:	Standardizing Drone spraying protocols for various inputs in selected field crops (Soybean, Pigeonpea, Wheat, Chickpea, Sugarcane)
2.	Location	:	Central Campus, Mahatma Phule Krishi Vidyapeeth, Rahuri
3.	Funding Agency	:	M/s Fowler Westrup Pvt. Ltd.
4.	Name of the Investigators		
	Principal Investigators	:	Dr. S.M. Nalawade Dr. U. S. Surve
	Co-Principal Investigators	:	Dr. S. A. Kadam Dr. Y. G. Saindane Dr. N. A. Musmade

5. Objectives

1. Standardizing dosages, mixing proportions and required chemical formulations (fertilizer, pesticides, nutrients etc.,) for select crop of Soybean, Pigeonpea.
2. Spray dynamics including nozzles, droplet size, drift test/dispersal of spray fluid; and assessing uniformity of spraying and phytotoxicity, if any
3. Comparing drone spraying in comparison to conventional spraying including savings of water and chemicals
4. Assessing the feasibility of drones for granule and dusting

6. Technical Programme

1. Assessing the phytotoxicity for various dosages and mixing proportions of specified chemical formulations for select crops
2. Assessing the spray dynamics in terms of droplet size, drift test/dispersal of spray fluid and uniformity in spraying using specified spray systems (nozzles) mounted on specified drone model for various dosages and mixing proportions of specified chemical formulations for select crops
3. Comparing drone spraying with conventional spraying for saving in labour, water & chemical.

7. Field Studies: Treatments/Spraying combinations (for specified crop)

- a) No. of spray and the corresponding crop growth stage
- b) Schedule of spray: Chemicals to be sprayed at each growth stage as per schedule (tentative schedule is provided below).

Sr. No.	Stage of Spray	Days after Sowing / Planting (DAS)	Chemicals to be sprayed			
			1	2	3	4
Soybean						
1	Branching	30-35 DAS	Foliar spray of 19:19:19 WSF	-		
2	Flowering	45-50 DAS	Imidacloprid 2.5ml/10 lit of water	Hexaconazole/crisoxym methyl to control	-	-

[Signature]



			to control Sucking pests (Aphid, Thrips & white fly)	rust disease		
3	Pod initiation	65-70 DAS	Flubendamide/ Indoxycarb / spinetoram to control leaf eating caterpillars (spodoptera)	Tebuconazole+ Sulphur to control the mosaic disease	-	-
Pigeonpea						
1.	Flowering	75-80 DAS	Indoxacarb 7 ml in 10 lit of water or Imamectin Benzoate 3 ml / lit of water.	-	-	-
2.	Pod initiation	100-105 DAS	Indoxacarb 7 ml in 10 lit of water or Imamectin Benzoate 3 ml / lit of water.	-	-	-

Note: Other chemicals permissible for the drone spraying can be included

c) Drone model

(i) Battery operated

d) Spraying mechanism

(i) Flat fan/ jet non-drifting nozzles (Battery operated)

(Nozzles below propeller/ nozzles mounted on boom)

e) Doses of chemicals

(i) 0.75 X

(ii) 1.0 X

f) Mixing Proportions/Water Volume

Initial Stages

(i) 20 lit/ha

(ii) 25 lit/ha

(iii) 30 lit/ha

Development stages

(i) 20 lit/ha

(ii) 30 lit/ha

(iii) 40 lit/ha

g) Control by conventional spraying

Notes:

1. There are 6 combinations of drone spraying for one spray of specified chemical (1 drone model, 2 dosages and 3 mixing proportions) and one conventional spraying operation
2. The standard drone operating and environmental parameters required for corresponding water volume and as per SoP will be considered
3. The area of 40 x 20 m (800 sq m) will be used for one treatment including buffer strips. Total area that will be required for the experimentation on one crop is 4800 sq m i.e. approximately 0.5 ha.
4. The trails will be non-replicated; however the observations (Sr. No. h 1) to 7)) will be replicated in one treatment block using sample plot technique.

h) Observations to be recorded



Performance Parameters

1. Phyto-toxicity
2. Scorching effect
3. Bio-efficacy/ Control efficiency (only in case of corresponding pest/disease attack)
4. Droplet size distribution
5. Spray uniformity
6. Labourer requirement
7. Other observations required to work out the cost of spraying by various mechanisms

Drone Operating parameters

1. Speed
2. Height above canopy
3. Swath
4. Buffer

Environmental Parameters

1. Temperature
2. Humidity
3. Wind speed
4. Other parameters

8. Lab studies

a) Standardisation of spraying system for optimum performance of spraying
Treatments

Spraying systems: Nozzles below propeller and nozzles mounted on boom


Type of nozzles: Flat fan and jet non-drifting nozzles

b) Standardization of drone spraying parameters

Treatments

Height

Speed


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Annexure-III

Educational qualifications and experience for contractual positions

Young Professional-II and Field Assistant

Name of the Post	Discipline/Subject	No. of Posts	Qualifications
Young Professional-II	Farm Machinery and Power Engineering	01	Graduate with at least 60% marks in Agricultural Engineering with one year experience in relevant field. OR Masters or M. Tech. (Agri. Engg.) degree in Farm Machinery and Power Engineering or equivalent
Young Professional-II	Plant Protection	01	Graduate with at least 60% marks in Agriculture with one year experience in relevant field. OR Masters or M.Sc. degree in Plant Pathology/Entomology or equivalent
Field Assistant	Agriculture and allied	02	Essential: 1. Diploma/Degree in Agriculture 2. At least two years of field experience Desirable: 1. Field experience in University/State/ Central Govt. managed projects/ schemes farms. 2. Field experience of working with crops: Soybean, Pigeonpea, Wheat, Chickpea, Sugarcane


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