Annexure II

TEST PROTOCOL FOR PHYTO-TOXICITY (CROP SAFETY) EVALUATION OF PESTICIDE FORMULATION ON CROP WHEN APPLIED THROUGH DRONE

1.0 APPLICABLILITY

- This protocol to be used as model protocol for generating phyto-toxicity (crop safety) data on crop using Drone as spraying equipment for pesticide formulation which is already approved for use on that crop using conventional sprayer / knapsack sprayer.
- When proposed **critical Good Agriculture Practices** (cGAP), e.g. AI dose/ha, Pre harvest Interval (PHI) and number of applications, for Drone spray is within a recommended / approved range of conventional spray.

2.0 TRIAL CONDITION DETAILS

2.1 Name of Crop:

2.2 Variety of Crop:

2.3 Objective: To test phytotoxicity effects on targeted crop

2.4 Cultivation Details: Standard cultural practices like application of FYM; fertilizers including micronutrients and other maintenance treatments including pest management practices for pests should be carried out.

3.0 TRIAL DESIGN AND ARRANGEMENT DETAILS

3.1 Name of pesticide:

3.2 Trial plot arrangement

3.2.1 Design:

3.2.2 No. of replicates: Three

3.2.3 Plot Size: Min. 500 sq. m (20 m x 25 m) per replication per treatment

4.0 PESTICIDE APPLICATION DETAILS:

4.1 Treatment Details:

Tr. No.	**Treatment**	**Dosage / ha**			**Equipment for Application**	**Time & No. Applications**
		a.i. (g)	**Formulation (g or ml)**	**Water volume (Lit.)**		

T_1	Untreated Control	-	-	-	-	-
T_2	Pesticide Formulation (X-dose)	Approved dose with conventional sprayer (use max approved dose)	Approved dose with conventional sprayer	Proposed water volume	Drone	Single application at approved PHI
T_3	Pesticide Formulation (2X-dose)	Double the approved dose with conventional sprayer	Double the approved dose with conventional sprayer			

4.2 Flight Parameter Details:

Drone Model	As per availability and actual data submitted
Flying height	As per actual data submitted
Spray swath / width	As per actual data submitted
Flying speed	As per actual data submitted
Spray droplet size	As per actual data submitted
Nozzle type and operation	As per actual data submitted
Buffer zone	As per actual data submitted

5.0 APPLICATION EQUIPMENT DETAILS

5.1 Type of Drones:

6.0 DETAILS OF LICENSE PILOT/ OPERATOR, REGISTRATION OF DRONE DETAILS ETC.

6.1 Drone License Details: attach the relevant certificates/documents

6.2 Pilot License Details: attach the relevant certificates/documents

7.0 DATA RECORDING AND MEASUREMENT METHODS DETAILS

Phytotoxicity (Crop Safety Data)

Phyto-toxicity rating as per following scale shall be recorded individually **for yellowing, stunting, necrosis, epinasty and hyponasty and crop recovery.**

Crop Response Injuries Rating: Phytoxicity Rating Scale (PRS)

Number of days	Yellowing	Stunting	Necrosis	
			epinasty	hyponasty
1				
5				
10				
15				
20				
Comments/Observations				

- The PRS is to be reported on rating/scale of 0 to 10 as follow:

Rating	**Crop Response / Crop Injury (%)**	**Verbal Description**
0	0	No symptoms, Mark No when no adverse injury noticed
1	1-10	Very slight discoloration
2	11-20	More severe, but not lasting
3	21-30	Moderate and more lasting
4	31-40	Medium and lasting
5	41-50	Moderately Heavy
6	51-60	Heavy
7	61-70	Very heavy
8	71-80	Nearly destroyed
9	81-90	Destroyed
10	91-100	Completely destroyed.

Annexure III

TEST PROTOCOL FOR BIO-EFFICACY EVALUATION OF PESTICIDE FORMULATION ON CROP WHEN APPLIED THROUGH DRONE

1.0 APPLICABLILITY

- This protocol to be used as model protocol for generating bio-efficacy data on crop for exclusive use of Drone as spraying equipment for pesticide formulation.
- When proposed critical Good Agriculture Practices (cGAP), e.g. AI dose/ha, Pre harvest Interval (PHI) and number of applications, for Drone spray is not within a range of conventional spray.

2.0 TRIAL CONDITION DETAILS

2.1 Name of Crop:

2.2 Variety of Crop:

2.3 Objective:

- To test bio-effectiveness against targeted pest / disease / weeds
- To test phytotoxicity effects on targeted crop
- To test effect on natural enemies (applicable only for insecticides)
- To test effect on succeeding crops (applicable only for herbicides and only when there are residues above LOQ in soil at the time of harvest of main crop)

2.4 **Cultivation Details:** Standard cultural practices like application of FYM; fertilizers including micronutrients and other maintenance treatments including pest management practices for pests other than targeted above should be carried out.

3.0 TRIAL DESIGN AND ARRANGEMENT DETAILS

3.1 Name of pesticide:

3.2 Standard Check:

3.3 Trial plot arrangement

3.3.1 Design:

3.3.2 No. of replicates: The sufficient replications to be kept meeting the degree of freedom i.e. 12

3.3.3 Plot Size: Min. 500 sq. m (20 m x 25 m) per replication per treatment

4.0 PESTICIDE APPLICATION DETAILS:

4.1 Treatment Details:

- Drone spray: Three dosages for bio-effectiveness study + 2X dose for phyto-toxicity study
- Standard check: In case, standard check with Drone spray approval is not available, consider the product having approval for backpack spray.
- Untreated control: Untreated control to be kept for comparison.

4.2 Flight Parameter Details:

Drone Model	As per availability and actual data submitted
Flying height	As per actual data submitted
Spray swath / width	As per actual data submitted
Flying speed	As per actual data submitted
Spray droplet size	As per actual data submitted
Nozzle, type and operation	Check type of Nozzle, size & flow rate before application
Buffer zone	As per actual data submitted

5.0 APPLICATION EQUIPMENT DETAILS

5.1 Type of Drones:

5.2 Standard check application equipment (if other than Drone):

6.0 DETAILS OF LICENSE PILOT/ OPERATOR, REGISTRATION OF DRONE DETAILS ETC.

6.1 Drone License Details: attach the relevant certificates/documents

6.2 Pilot License Details: attach the relevant certificates/documents

7.0 DATA, RECORDING AND MEASUREMENT METHODS DETAILS

7.1 Meteorological and Soil Data Details

7.1.1 Weather conditions: The precipitation (mm), temperature (daily average temperature, maximum temperature and minimum temperature, °C), relative humidity (%), wind force (m/s) and wind direction during the trial period should be recorded. Adverse climatic factors if any, that will affect the trial results throughout the trial period, such as severe or prolonged droughts, heavy rains and hail, must be recorded.

7.1.2 Soil data: The soil type should be recorded.

7.2 Bio-effectiveness: Generate data as per existing requirements of conventional spray

7.3 Phytotoxicity (Crop Safety Data)

Phyto-toxicity studies should be prescribed in a specific protocol as per draft enclosed as Annexure-2.

7.4 Effect on Natural Enemies (Applicable only for Insecticides): Generate data as per existing requirements of conventional spray

7.5 Effect on Succeeding Crops (applicable only for herbicides and only when there are residues above LOQ in soil at the time of harvest of main crop): Generate data as per existing requirements of conventional spray

7.6 Drone Spray Droplet Deposition Analysis

7.7 Yield: Record yield per hectare

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