

Ultra Low Volume Application of Phosphanidan 100 for Control of Paddy Pests in Thanjavur

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The use of insecticide emulsions in the pure form without diluting with water is a relatively recent concept in plant protection and this method of spraying has come to be known as ultra low volume application. This method of application has been practised for control of certain crop pests in countries like U. S. A. and Japan. The advantages of this system of dispensing the chemical are that large areas are covered in a short time, the load of water to be carried is eliminated, fewer tank loads of material are required and fewer aircrafts would suffice. The spray is rendered into droplets of size less than 100μ and such small droplets are considered to be more effective than larger droplets discharged by low volume spraying. Toshiharu Uejima (1970) mentions that U. L. V. aerial spraying is the most required in the control of insect pests and diseases of rice for effective coverage of areas in a short time. Joyce *et al.* (1970) reports of large scale and successful spraying of paddy in Java with phosphamidon 100% at the rate of 15,000 ha. per day.

Based on the experience in Indonesia, Messrs. Ciba of India Limited, came forward during December, 1969 to take up, on a free basis, a pilot spraying in the district with a view to demonstrating the efficacy of phosphamidon as a waterless spray. The details of the spraying conducted and the results obtained are dealt with in this article.

Materials and Methods: A contiguous area of 3277 acres of Thaladi (mainly CO 25) in tillering phase, *i. e.* about a month old, distributed over 5 villages was marked out for spraying. The area had the advantage of having natural boundaries formed by two rivers and a railway line. This area was sprayed with phosphamidon 100 in the pure form by means of Ciba Pilatus Turbo Porter aircraft fitted with electrically driven spinning disc atomisers. An electronic system of aircraft guidance by adopting a track guidance system evolved by the Decca Navigation Company was adopted for the demarcation of swaths. The plane flew at a height of about 9 metres in areas not obstructed by trees, the swath width being about 80 metres. The prevailing wind speed was 15-25 kts. The flow rate of fluid was 7 litres per minute.

The first round of spraying was given on December 25, and the chemical was dispensed at the rate of 149.5 ml per acre. The second

application was done on January 6, 1970 and the rate applied per acre worked out to 127 ml per acre. Only 1965 acres were treated this time since the crop had come to flowering in the remaining area. A third application was given to the above area on January 18, 1970 and the rate of application of the chemical worked out to 140 ml per acre.

Strips of sensitive papers (encapsulated ink paper) were set up vertically in the fields at different places to assess the spraying deposits. The strips were removed after spraying and the number of droplets deposited on them were recorded from 20 one square centimetre samples at each time. The average deposit per square centimetre was 23.13 and 8 in the first, second and third sprayings respectively.

One hundred number of half metre square samples distributed equally among five villages at the rate of 20 per village were examined for pest counts, the day before and 48-72 hours after each spraying. The number of samples were restricted to 60 from 3 villages representing the reduced area during the second and third sprayings. From a selected control area of about 500 acres in the vicinity, 20 samples were examined for comparison. In each sample, the total number of plants and total number of tillers as also the tillers affected by paddy stem borer and gall-fly were recorded. In addition, the population of green jassids, white jassids and fulgorids was recorded before and after treatment by shaking the plants and noting the number of adults and nymphs falling on the water surface and the reduction brought about in the population was assessed. A final count in respect of white ears caused by stem borer was also taken in the earhead stage. No yield data were gathered as the area treated was vast with varying degrees of fertilities with the crop having been planted on different dates.

Results and Discussion : The data gathered are furnished in Annexures I to IV. The following broad inferences can be drawn.

There has been a general reduction in infestation by the stem borer, *Tryporyza incertulas* Walker, from an initial degree of 3.7% to 2.8% at the second spraying and to 1.4% at the third spraying as compared to 3.4, 4.3 and 3.1% respectively under control. However, counts of white earheads taken a month and a half after the final spraying have shown an infestation of 2.1% in the treated area as compared to 3.7% under control. There has been a knock down kill of a large number of stem borer moths especially after the first spraying.

In the case of the gallfly, *Pachydiplosis oryzae* (Wood-Mason), the percentage of infestation declined from 2.6% at the initial to 1.4% at the second and 1.6% at the third spraying as against 3.4, 3.3 and 2.5% respectively under control.

ANNEXURE I. First Round Ultra Low Volume Spraying Assessment

District : Thanjavur, Treatment : Phosphamidon 149.5 ml/ac, Date of spraying : 25-12-69

Dates on which recorded : Initial count : 24-12-69, After treatment : 27-12-69

Name of village	Total No. of samples examined	Total No. of plants in the 1/4 sq. metre sample	Total No. of tillers	Dead hearts	White ears	Percentage	Galls	Percentage	Insect Counts							
									Green Jassid		White Jassid		Fulgorid			
									Initial	After	Reduction %	Initial	After	Reduction %		
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Treatment																
Mathur	20	209	2059	68	3.3	54	2.6	206	8	96.1	43	7	83.7	14	Nil	100
Nallucheri	20	224	1816	55	3.0	28	1.5	245	57	76.7	71	2	97.2	24	3	87.5
Thandankorai	20	191	1747	83	4.8	16	0.9	178	19	89.3	52	5	90.4	7	Nil	100
Manankorai	20	232	2519	74	2.9	94	3.7	209	43	79.4	26	10	61.5	22	3	86.4
Kondavittanthidal	20	192	1369	64	4.7	58	4.2	185	49	73.5	49	9	81.6	13	Nil	100
Average of percentage					3.7%		2.6%			83.0%			82.9%			94.8%
Average population per sample								10.2	1.8		2.4	0.3		0.8	0.6	
Control :																
Thittai	20	287	2417	82	3.4%	81	3.4	245	290	Nil	28	112	Nil	38	45	
Average of population per sample								12.3	14.5		1.4	5.6		1.9	2.3	

ANNEXURE 2. Second Round Ultra Low Volume Spraying Assessment

District : Thanjavur, Treatment : Phosphamidon 127 ml/acre, Date of spraying: 6-1-1970

Dates on which recorded : Initial counts 5-1-70, After treatment : 9-1-70

Name of village	Total No. of samples examined	Total No. of plants in the $\frac{1}{4}$ square metre sample	Total No. of tillers	Dead hearts white ears	Percentage	Galls	Percentage	Green Jassid		White Jassid		Fulgorid	
								Initial	Final	Initial	Final	Initial	Final
Treatment :													
Mathur	20	208	2093	54	2.6	31	1.5	61		4		4	
Nalluchery	20	214	1954	63	3.2	27	1.4	89		13		1	
Thandankorai	20	181	2178	58	2.7	31	1.4	44		10		1	
Average of percentage					2.8								1.4
Average of population per sample								3.2		0.4			0.2
Control :													
Thittai	20	205	2023	87	4.3	67	3.3	138		29		7	
								6.9		1.5			0.4

* Incidence very low for assessing knockdown efficiency

ANNEXURE 3. Third Round Ultra Low Volume Spraying Assessment

District : Thanjavur, Treatment : Phosphamidon 140 ml/acre, Spraying : 18-1-1970
 Dates on which recorded : Initial count 17-1-70, After treatment 21-1-70

Name of village	Total No. of samples examined	Total No. of plants in the 1/4 sq. meter sample	Total No. of tillers	Insect Counts						
				Dead hearts white ears	Percentage	Galls	Percentage	Green Jassid Initial*	White Jassid Initial*	Fulgorid Initial*
Mathur	20	198	2230	27	1.2	41	1.8	73	30	15
Nallucheri	20	203	2167	44	2.0	30	1.4	44	44	11
Thaadankorai	20	195	2219	24	1.1	34	1.5	24	21	Nil
Average of percentage					1.4		1.6			
Average of population per sample								2.4	1.6	0.4
<i>Control :</i>										
Thittai	20	213	2204	69	3.1	35	2.5	82	45	7
Average of population per sample								4.1	2.3	0.4

* Initial population too low for assessing post treatment knock down kill

ANNEXURE 4. Statement showing the infestation by stemborer and gallsy and population of green jassids, white jassids and fulgorids. Recorded before each and at the earhead stage.

Area treated and dates of treatment	No. of $\frac{1}{2}$ metre sq. samples examined		Average percentage of deadhearts		Percentage of silver shoots		Green jassid		White jassid		Fulgorid	
	Treat-ment	Cont-rol	Treat-ment	Cont-rol	Treat-ment	Cont-rol	Treat-ment	Cont-rol	Treat-ment	Cont-rol	Treat-ment	Cont-rol
I Round 3277 acres (25-12-69)	100	20	3.7	3.4	2.6	3.4	10.2	12.3	2.4	1.4	0.8	1.9
II Round 1965 acres (6-1-70)	60	20	2.8	4.3	1.4	3.3	3.2	6.9	0.4	1.5	0.2	0.4
III Round 1965 acres (18-1-70)	60	20	1.4	3.1	1.6	2.5	2.4	4.1	1.6	2.3	0.4	0.4
* Final count White earheads (2-3-70)	60	20	2.8	3.7

* N.B. The incidence of pests other than stemborer was only stray and hence no counts were taken at the final count. A higher sampling of counts of pests was found impracticable.

The average population of the green jassid, *Nephotettix impicticeps* Ashmead, recorded per half metre square sample showed a downward trend at the counts taken before each time of spraying both under treatment and control, the population being much less in the treated area as compared to control. The average population figures were 10.2, 3.2 and 2.4 at the initial, second and third counts respectively as against 12.3, 6.9 and 4.1 under control. A natural decline also was experienced as the crop grew to maturity. The knock down kill of this pest was very pronounced at the time of first spraying. During the second and third sprayings, the incidence was rather low for correct assessment. The incidence of the white jassid, *Tettigella spectra* Dist. and the fulgorid, *Nilaparavata lugens* Stal. was generally low and at the earhead stage, these hoppers were evident in stray number only.

Other Observations: At the time of spraying, the spray droplets fell into the eyes and caused a sharp stinging irritation in the eyes of onlookers. Enquiries with ryots and general observations made did not show any untoward effect on human beings, cattle or fish.

With the aircraft used, it was not possible to restrict the spray application strictly to paddy fields alone.

The spraying system adopted has served to cover the large area in a very short time, the time taken being 1 hour 45 minutes for covering 3277 acres. The dispensing of the chemical was originally planned by the firm at 110, 120 and 130 ml per acre. However, in actual application, the rates exceeded this limit.

Cost of operations

	Cost of chemical		Aircraft charges per acre as quoted by the firm (Rs.)	Total (Rs.)	Average cost per acre for each spraying (Rs.)
	Quantity used per acre (ml)	Value (Rs.)			
First round	149.5	11.15	4.00	15.15	} 14.30
Second round	127	9.40	4.00	13.40	
Third round	140	10.36	4.00	14.36	

Summary: The infestation by stemborer and gallfly was brought down in the treated area as compared to control.

There has been a good kill of the green and white jassids and fulgorids at the first round of spraying. The population of jassids and fulgorids was rather low during the second and third sprayings for deriving definite

conclusions. A large number of stemborer moths and jassids were noted dead in the fields, especially after the first spraying.

A large area was covered in a very short time, a unique feature experienced for the first time in this country. There were no reported cases of health hazards to the people, or animals *etc.*, due to the spraying.

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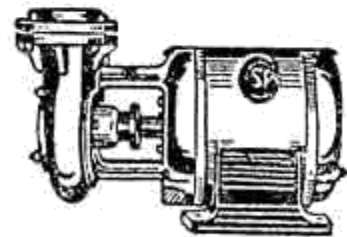
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