Calculation of spray volume for knapsack sprayers of 19-liter (5-US gallon), 16-liter (4.2-US gallon). and 10-liter (2.6-US gallon) capacities. IRRI, 1980.

Sprayerloads (no./field)	Spray volume (liters/ha) when field size is											
	0.2 ha	0.4 ha	0.6 ha	0.8 ha	1.0 ha	1.2 ha	1.4 ha	1.6 ha	1.8 ha	2.0 ha	2.2 ha	2.4 ha
	19-liter capacity hackpack sprayer											
5	475	238	158	119	95	79	68	59	53	48	43	40
10	950	475	317	238	190	158	136	119	106	95	86	79
15	1425	713	475	356	285	238	204	178	158	143	130	119
20	1900	950	633	475	380	317	271	238	211	190	173	158
25	2375	1188	792	594	475	396	339	297	264	238	216	198
30	2850	1425	950	713	570	475	407	356	317	285	259	238
35	3325	1663	1108	831	665	554	475	417	369	333	302	277
40	3800	1900	1267	950	760	633	543	475	422	380	345	317
45	4275	2138	1425	1069	855	713	641	534	475	428	389	356
50	4750	2375	1583	1188	950	792	679	594	528	475	434	396
	16-liter capacity backpack sprayer											
5	400	200	133	100	80	67	57	50	44	40	36	33
10	800	400	267	200	160	133	114	100	89	80	73	67
15	1200	600	400	300	240	200	171	150	133	120	109	100
20	1600	800	534	400	320	267	229	200	178	160	145	133
25	2000	1000	667	500	400	333	286	250	222	200	182	167
30	2400	1200	800	600	480	400	343	300	267	240	218	200
35	2800	1400	934	700	560	466	400	350	311	280	255	233
40	3200	1600	1067	800	640	533	457	400	356	320	291	267
45	3600	1800	1200	900	720	600	514	450	400	360	327	300
50	4000	2000	1334	1000	800	667	571	500	444	400	364	333
	10-liter capacity backpack sprayer											
5	250	120	83	63	50	42	36	31	28	25	23	21
10	500	250	167	125	100	83	71	63	56	50	45	42
15	750	375	250	188	150	125	107	94	83	75	68	63
20	1000	500	333	250	200	167	143	125	111	100	91	83
25	1250	625	417	313	250	208	179	156	139	125	114	104
30	1500	750	500	375	300	250	214	188	167	150	136	125
35	1750	875	583	438	350	292	250	219	194	175	159	146
40	2000	1000	667	500	400	333	286	250	222	200	182	167
45	2250	1125	750	563	450	375	321	281	250	225	205	188
50	2500	1250	833	625	500	417	357	313	278	250	227	208

To use the chart, first determine the size of the sprayer and refer to that section designated 19-, 16-, and 10-liter capacity. To find the spray volume for 0.1- to 2.5-ha fields, refer to the column heads designating the area of the field in hectares. Along the left margin is the number of sprayerloads per field, from 5 to 50 in increments of 5. You may need to round off. Follow the appropriate row for sprayer size and column for field area to find the spray volume.

For example: • with a 19-liter sprayer and a 1.4-ha field, 30 sprayerloads/field will apply 407 liters/ha; • with a 10-liter sprayer and a 0.8-ha field, 10 sprayerloads/field will apply 125 liters/ha. In this case, the farmer should increase his spray volume to 20 or 25 sprayerloads/ha and apply 250 to 313 liters/ha. ■

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A rapid technique for estimating brown planthopper feeding activity

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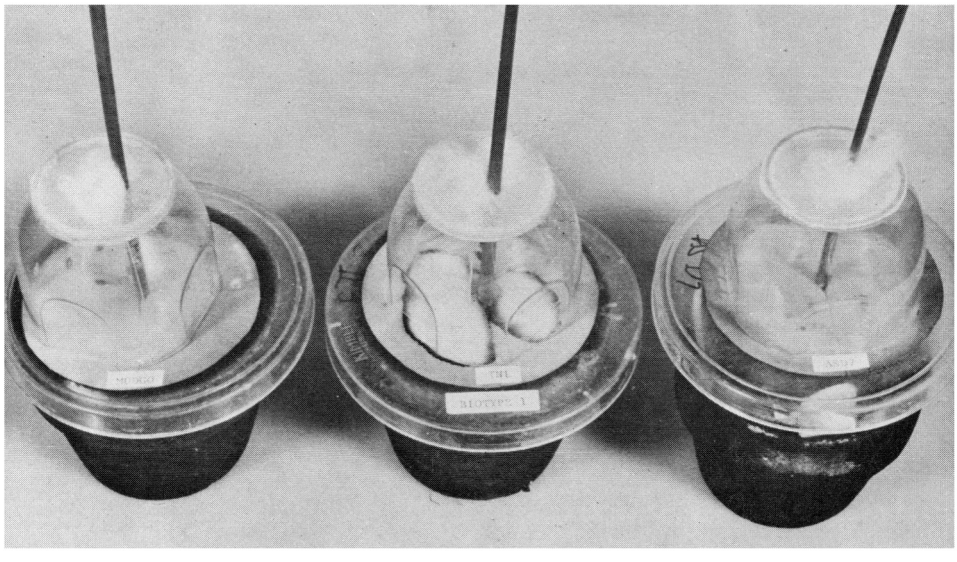
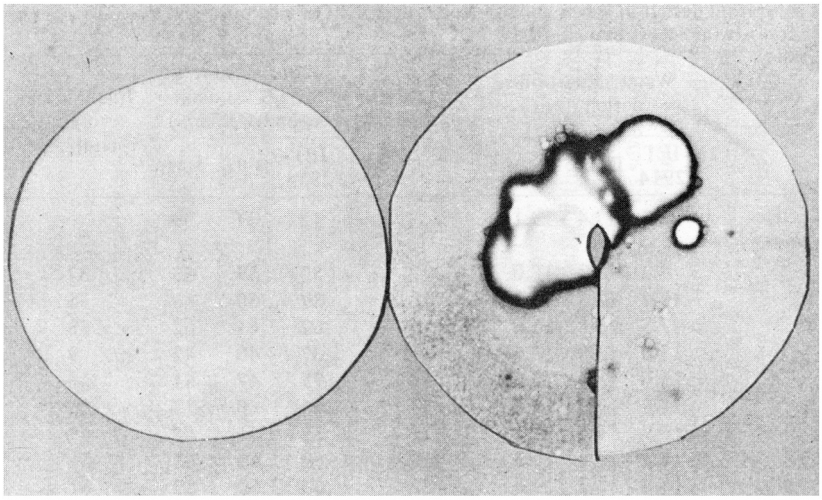
Various techniques are being evaluated to determine the level of brown planthopper (BPH) resistance in rice varieties more accurately than by screening seedlings in seedboxes. One common technique is to measure BPH feeding activity. It involves the measurement of honeydew excreted by BPH adults. The area of the spots produced by honeydew excreted on filter paper is measured. Filter paper is placed around the base of the test plant in a feeding chamber; then, 4- to 5-day-old females, previously starved for 4 or



1. Chamber used to evaluate brown planthopper feeding activity. Note the bromocresol-treated *filter paper on the inverted petri dish.*



2. Bromocresol-treated filter paper that has not (left) and that has (right) been exposed to brown planthopper honeydew.

5 hours, are allowed to feed for 24 hours. Honeydew excreted by BPH is absorbed on the filter paper. After the feeding duration, the filter paper is removed and treated with 0.001% ninhydrin in acetone solution and oven-dried at 100°C for 5 minutes. The honeydew spots appear as violet or purple because of' their amino acid content. The area of ninhydrin-positive spots is traced on paper and placed on millimeter-square graph. The squares are then counted. (Spots must be traced within a few days because they fade rapidly.)

The technique has been modified to estimate BPH feeding activity during the feeding period as the filter papers are treated before placement in the feeding chamber and spots appear as soon as the honeydew makes contact. The new technique is a modification of that used in aphid feeding studies using filter papers treated with bromocresol blue. Whatman No. 1 filter paper is impregnated twice with bromocresol green solution (2 mg/ml ethanol). The filter paper is allowed to dry for 1 hour, then re-treated with the solution. This turns the filter paper to orange. Insects are placed in the feeding chamber through a hole at the top, which is then plugged with cotton (photo 1). The filter paper is removed 24 hours later (photo 2). The stained filter paper can be stored as long as 3 months after the test, or until enough time is available to trace the spots and measure their area. The treated filter paper should not be moistened because water can cause spots to form. ■

Soil and crop management

Effect of seed pretreatment on rainfed dryland rice production and on water saturation deficit in leaves

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The effects of seed pretreatment on germinability, plant growth, and grain production in direct-seeded dryland rice were studied during three seasons from 1976 to 1979. In laboratory trials, the increases in shoot length (16 to 48%) and root length (5 to 33%) at 4 and 6 days after the start of the experiments were significant. In field experiments, the plants grown from pretreated seeds significantly outscored those from untreated seeds in plant height and population per unit area. The increases in tiller number per unit area of the pretreated vs untreated seeds (control) were 22% when seeds were pretreated with Na_2HPO_4 (10^{-3} m) in 358 ppm solution for 6 hours; 22% with soaking in 200 ppm solution of Agromin (a chemical formulation consisting of

Table 1. Effects of seed treatments on grain yields of rice varieties (V) at 14% moisture. West Bengal, India.

Seed treatment (T)	Grain yields (t/ha)									
	1976				1977			1978		
	IET 2914	Dular	IR442 -58	Mean	IET 2914	Dular	Mean	IET 2914	Dular	Mean
Control (untreated)	1.8	1.7	1.7	1.7	1.9	1.8	1.9	1.9	1.8	1.8
Soaking in distilled water										
24 h	1.9	1.8	1.9	1.9	2.4	2.2	2.3	2.2	2.1	2.2
48 h	2.0	1.9	2.0	1.9	2.4	2.3	2.4	2.2	2.2	2.2
24 h double[a]	1.9	1.8	1.9	1.9	2.3	2.1	2.2	2.0	2.0	2.0
NaCl	1.8	1.8	1.8	1.8	2.4	2.1	2.2	2.1	2.1	2.1
NaH_2PO_4	2.0	1.9	1.9	1.9	2.4	2.2	2.3	2.2	2.2	2.2
Na_2HPO_4	2.1	2.0	2.0	2.0	2.5	2.3	2.4	2.3	2.3	2.3
$Al(NO_3)_3$	1.9	1.9	1.9	1.9	2.3	2.2	2.3	2.2	2.1	2.1
$CoNO_3$	1.9	1.8	1.9	1.9	2.4	2.1	2.3	2.0	2.1	2.0
Agromin	1.9	1.8	1.8	1.8	2.4	2.1	2.2	2.2	2.0	2.1
Fungicide treated	1.8	1.8	1.8	2.1	1.9	2.0	2.0	2.0	2.0	2.0
Mean	1.9	1.8	1.9	1.8	2.3	2.1	2.2	2.1	2.1	2.1
	V	T	V x T	V	T	V x T	V	T	V x T	
S Em (±)	0.01	0.03	0.03	0.04	0.03	0.05	0.05	0.06	0.08	
CD at 5%	0.05	0.07		0.12	0.09			0.16		
CV		7.0			15.0			19.4		

[a] The 24-h soaking was repeated.