



2024 AMTEC TECHNICAL BULLETIN

MIST BLOWER



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**AGRICULTURAL MACHINERY
TESTING AND EVALUATION CENTER**

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INTRODUCTION

A mist blower is an agricultural machine used to spray liquid into fine droplets of liquid or mist. This type of agricultural machine is commonly and primarily used for pesticide applications. However, the machine is still not widely used in the country since farmers rely more on the pressurized type of sprayer. Aside from its main function as a pesticide applicator, mist blowers are used for spraying insecticides, pesticides, herbicides, and fertilizers in measured quantities (Kraft & Pinto, 2019). The introduction of the 3-in-1 function of mist blowers paved the way for its marketing locally.

There are two major classifications of mist blowers as discussed in PNS/PAES 155:2010 Agricultural Machinery – Mist Blower – Specifications. The first classification is the backpack mist blower in which the unit is carried by the operator on his back for mobility (Figure 1). The second classification is the mounted mist blower in which the unit is mounted to a tractor or vehicle for mobility (Figure 2). Between the two types of mist blowers, the former is more commonly utilized.

When mist blowers are used as a pesticide applicator, the pesticide flows through the pesticide hose and goes out of the nozzle. Other additional functions of the mist blower include fertilizer applicator, seed sower, and feeds' broadcaster. To perform these functions, the mist blower must be shifted to its dusting or spreading mode. During dusting and spreading mode, the materials (i.e., fertilizer, seeds, feeds) are expelled out of the hose.

As of 2023, AMTEC has tested 25 mist blowers of different brands and models. This paper aims to provide information on the different mist blowers available in the market that were tested by AMTEC and to present the different performances of these mist blowers.



Major Parts of the Mist Blower

1. **Tank** – Container in which the pesticide/feeds/seeds/fertilizers are loaded
2. **Pesticide hose** – Passageway of pesticide from the tank to the nozzle
3. **Cut-off valve** – Valve used to stop the flow of fluid
4. **Engine** – Prime mover of the machine
5. **Wand** – Connects the nozzle to the blower
6. **Flexible hose** – Bendable hose for easier aiming/directing the nozzle of the mist blower
7. **Adjustable knob** – Adjusts and controls the discharge of pesticide
8. **Metering unit** – Adjusts and controls the discharge of pellets/feeds/seeds
9. **Nozzle** – a tube connected to the end of the hose to control the liquid sprayed

PERFORMANCE CRITERIA

The performance test of the mist blowers is based on PNS/PAES 156:2010 Agricultural Machinery – Mist Blower – Methods of Test. The parameters tested are as follows:

1. **Discharge Rate** – The amount of pesticide/seeds/fertilizers/feeds expelled per unit time (i.e., kg/s or L/min)
2. **Fuel Consumption** – The amount of fuel consumed per unit time (L/h)
3. **Speed of Component** – Measurement of the rotational speed of the shaft per unit time (revolutions per minute)
4. **Noise Level** – Measurement of the sounds/acoustics produced by the equipment (db(A))
5. **Width of Spray** – Maximum range carried out by the mist blower measured horizontally
6. **Blower Range** – Distance from the nozzle/hose at which spraying could be carried out
7. **Air Velocity** – Speed of air being expelled out of the hose
8. **Tilt Test** – Method for checking leaks on the mist blower; conducted by filling the tank with water and tilting the unit at an angle of 90° for 5 minutes on all sides
9. **Inversion Test** – Another method for checking leaks on the mist blower; conducted after the tilt test and is performed by inverting the unit for 5 minutes
10. **Ease of Operation** – The adaptation to the back of the operator; accessibility; ease of actuating controls, filling and cleaning the tank, dismantling, assembly, and maintenance of the mist blower; convenience in fixing the straps; and provisions for adjusting strap length

The mist blower shall not produce noise higher than the maximum permissible level prescribed by the Occupational Safety and Health Act (Table 1).

Table 1. Permissible noise exposure as required by the Occupational Safety and Health Act (OSHA), Federal Register, Vol 37., No. 202., 18 October 1972.

Hours of exposure per workday	Permissible noise level, dB(A)
8	90
6	92
4	95
3	97
2	100
1.5	102
1	105
0.5	110
0.25 or less	115

The machine shall have a discharge rate of 0.12 to 0.17 L/min per nozzle and an air speed of at least 90 m/s. The mist blower shall produce evenly-sized droplets and shall not produce run-off.



TESTING REQUIREMENTS

General Conditions for Test and Inspection

The manufacturer shall submit the operator's manual of the mist blower and shall abide by the terms and conditions set forth by an official testing agency. An officially designated skilled operator shall be able to demonstrate, operate, adjust, and repair matters related to the operation of the equipment. The site where the mist blower shall be tested shall have space greater than the maximum reach of the equipment, as specified in the operator's manual. If the mist blower encounters a major component breakdown or malfunction during the test, the test engineer shall terminate the test.



KEY RESULTS

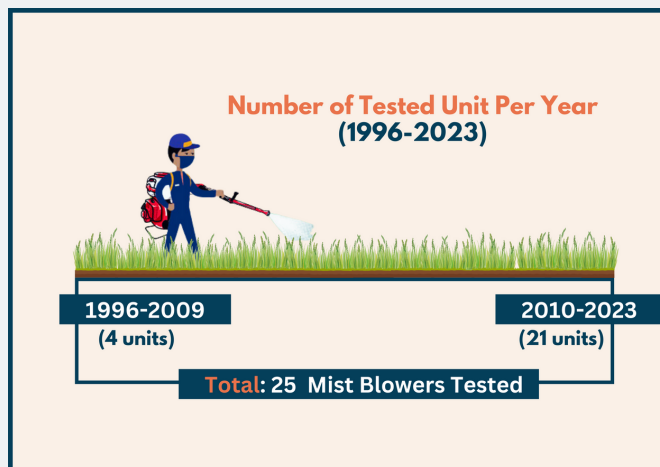


Figure 1. Number of tested mist blower units (1996 – 2023).

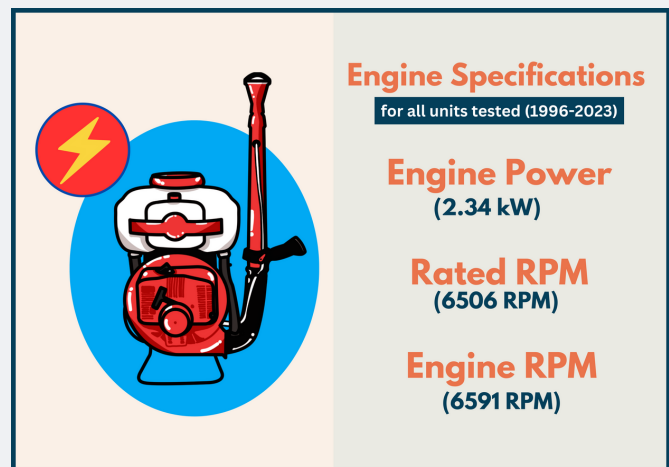


Figure 2. Engine specifications of the tested mist blower units (1996 – 2023).

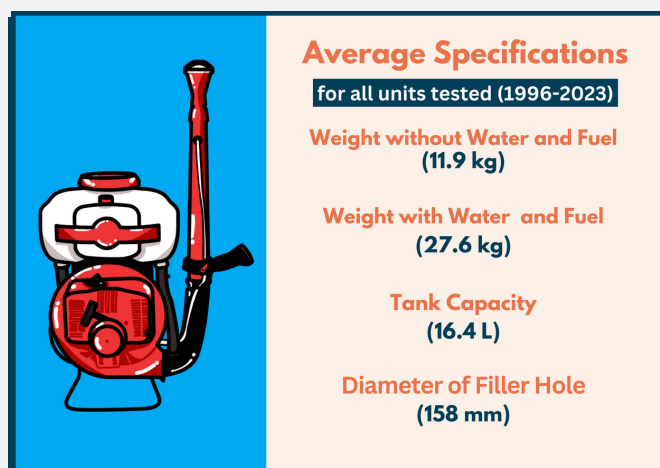


Figure 3. Average specifications of mist blower units tested (1996 – 2023).

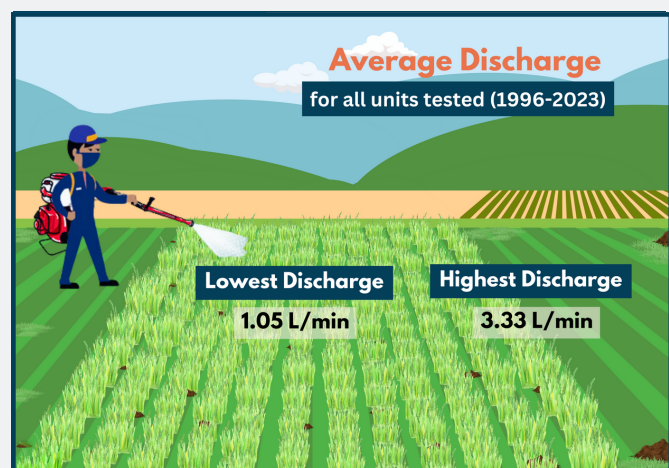


Figure 4. Average discharge of mist blower units tested (1996 – 2023).

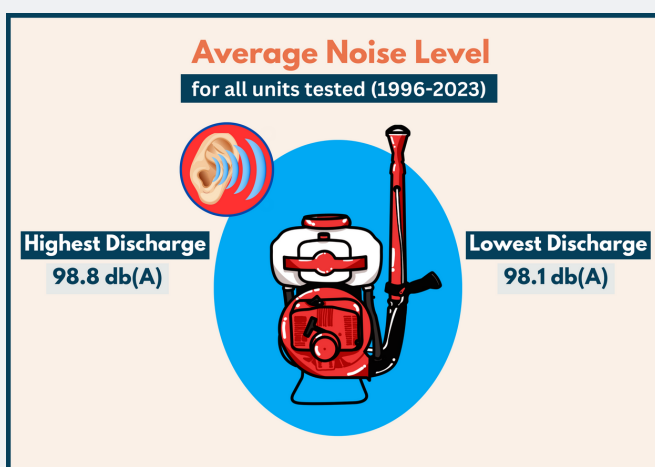


Figure 5. Average noise level of mist blower units tested (1996 – 2023).

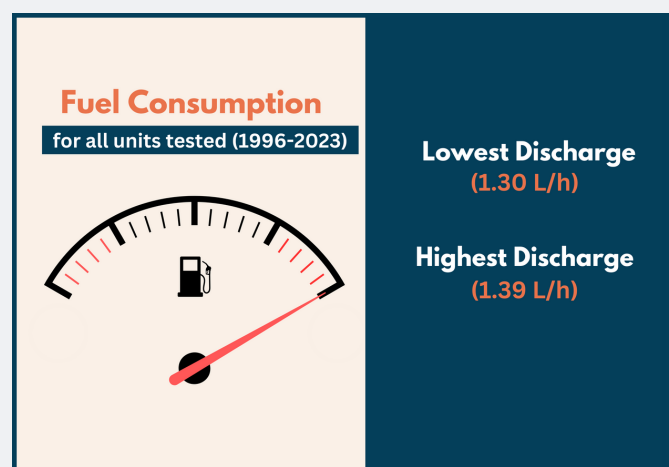


Figure 6. Average fuel consumption of mist blower units tested (1996 – 2023).

SUMMARY OF TESTING RESULTS

From 1996-2023, AMTEC tested a total of 25 mist blower units. Four (4) of the mist blower units were tested before 2010, while the rest of the units were tested between 2010-2023 (Table 2). Among the machines tested before 2010, three (3) were done in 1996 and one (1) in 2008. It is salient to note that three of the four units were requested to be tested by the National Food Authority (NFA).

Table 2. Knapsack mist blowers testing summary.

Mist Blowers Testing Summary	
Tested Before 2010	4
Tested On or After 2010	21
Total	25

All the mist blower units tested from 1996-2023 are backpack-type and are powered by gasoline engines. Nineteen (19) of the tested units are powered by two-stroke gasoline engines and six (6) are powered by four-stroke gasoline engines.

Table 3. Engine specifications of the tested mist blower units from 1996-2023.

Parameter	Range	Average
Maximum rated power, kW	0.80 - 3.73	2.34
Maximum rated speed, rpm	2800 - 8900	6506
Engine speed at full throttle, rpm	3423 - 8544	6591

Table 3 presents the engine specifications of the tested mist blower units from 1996-2023. The maximum rated power of these engines ranged from 0.80 kW to 3.73 kW with a maximum rated speed between 2800 rpm to 8900 rpm. Meanwhile, the average maximum rated power of the engine used by the mist blowers tested from 1996-2023 is 2.34 kW, with an average maximum rated speed of 6506 rpm. At full throttle, the engine speed of the tested mist blowers ranged between 5509 rpm to 8544 rpm. The average engine speed at full throttle of the tested mist blowers is 6591 rpm.

The manufacturer's technical data and information were also verified as part of the tests conducted on mist blowers. This is performed to confirm the mist blowers' mechanisms, dimensions, materials, and accessories and compare them with the technical data and information declared by the manufacturer. Some critical specifications measured and verified on mist blowers include weight, tank capacity, and the diameter of the filler hole. The average values of the specifications of the mist blower units tested from 1996-2023 are shown in Table 4.

Table 4. Average specifications of the mist blower units tested from 1996-2023.

Parameter	Average
Weight without water and fuel, kg	11.9
Weight with water and fuel, kg	27.6
Tank capacity, L	16.4
Diameter of filler hole, mm	158

During the conduct of the performance test on the mist blowers, the discharge rate, noise level, and fuel consumption at each discharge setting were determined. Some mist blowers only have one discharge setting while some may need up to six settings. The discharge rate is obtained by measuring the time it takes the mist blower to fill a specific volume. The minimum discharge of the mist blower units tested is 0.02 L/min while the maximum discharge is 6.72 L/min. Table 5 presents the average discharge (L/min), noise level (dB(A)), and fuel consumption (L/h) at the lowest and highest discharge setting of the tested mist blowers.

Table 5. Performance data of the mist blower units tested from 1996-2023.

Parameter	Requirement as per PNS/PAES 155:2010	Lowest Discharge Setting	Highest Discharge Setting
Discharge, L/min	0.12-0.17	1.05	3.33
Noise level, dB(A), maximum	97	98.1	98.8
Fuel consumption, L/h	None	1.30	1.39

Moreover, the blower air velocity of the machine is measured starting at one meter from the mist blower's nozzle until its maximum distance is reached. The instrument used by AMTEC for testing air velocity has a maximum capacity of only 20 m/s. Thus, the instrument can't measure if the air velocity of the units reached 90 m/s, which is the PAES 155:2010 requirement for mist blower air velocity. Out of the 25 tested units, only eleven (11) have air velocity data. The blower air velocity of these units ranged from 6.57 m/s to 23.83 m/s. The average air velocity measured is 13.21 m/s.

REFERENCES

01

Bureau of Philippine Standards, PNS/PAES 155:2010
Agricultural Machinery – Mist Blower – Specifications 4-8 (2010).

02

Bureau of Philippine Standards, PNS/PAES 156:2010
Agricultural Machinery – Mist Blower – Methods of Test 5–7 (2010).

03

Kraft, S. & Pinto, L. (2019). Backpack mist blowers for mosquito control. Retrieved September 28, 2021 from <https://www.pctonline.com/article/backpack-mist-blowers-for-mosquito-control/>.



ANNEX



ANNEX

MIST BLOWER DATA

Unit Number	Engine				Engine speed @ full throttle, rpm	Blower air velocity @ 1 m, m/s
	Power, kW	Type	Rated RPM	Fuel used		
1	1.27	2-stroke	6000	Gasoline	5509	ND
2	3.73	2-stroke	5800	Gasoline	ND	ND
3	3.73	2-stroke	5800	Gasoline	ND	ND
4	2.98	2-stroke	7000	Gasoline	ND	ND
5	2.50	2-stroke	ND	Gasoline	6672	ND
6	1.25	2-stroke	6500	Gasoline	6890	ND
7	2.60	2-stroke	ND	Gasoline	7585	ND
8	2.60	2-stroke	ND	Gasoline	7860	ND
9	3.70	2-stroke	7500	Gasoline	6280	ND
10	1.00	4-stroke	7000	Gasoline	5650	ND
11	ND	2-stroke	8900	Gasoline	8544	ND
12	1.00	4-stroke	7000	Gasoline	5650	ND
13	ND	4-stroke	ND	Gasoline	5858	ND
14	ND	2-stroke	ND	Gasoline	6932	14.43
15	1.00	4-stroke	ND	Gasoline	6856	10.20
16	2.60	2-stroke	2800	Gasoline	7480	14.90
17	ND	2-stroke	ND	Gasoline	7463	15.57
18	0.80	2-stroke	ND	Gasoline	7437	16.70
19	1.00	4-stroke	ND	Gasoline	3423	11.30
20	2.91	2-stroke	6800	Gasoline	6820	8.33
21	3.40	2-stroke	7300	Gasoline	7120	ND
22	2.90	2-stroke	6800	Gasoline	6425	8.47
23	3.00	2-stroke	5700	Gasoline	6073	23.83
24	3.00	2-stroke	5700	Gasoline	5883	14.96
25	2.13	4-stroke	7500	Gasoline	ND	6.57

ND - No Data; NM - Not Measured

ANNEX

MIST BLOWER DATA

Unit Number	Tank		Weight, kg	
	Capacity, L	Diameter of filler hole, mm	w/o Water and Fuel	w/ Water and Fuel
1	12.0	85	12.4	23.1
2	10.9	106	11.5	23.6
3	11.3	106	11.5	24.2
4	14.0	195	15.0	26.0
5	14.0	142	11.0	26.0
6	14.0	150	11.5	26.0
7	14.0	143	11.5	25.0
8	14.0	144	12.0	26.0
9	22.0	200	15.0	42.0
10	26.0	201	11.0	37.0
11	18.0	210	14.0	32.0
12	26.0	210	11.0	35.0
13	ND	ND	9.8	ND
14	ND	ND	NM	13.5
15	ND	ND	11.1	ND
16	ND	ND	12.0	ND
17	ND	ND	11.2	ND
18	ND	ND	7.9	ND
19	ND	ND	11.5	ND
20	ND	ND	12.5	ND
21	ND	ND	14.4	ND
22	ND	ND	12.9	ND
23	ND	ND	11.7	ND
24	ND	ND	11.6	ND
25	ND	ND	11.3	ND

ND - No Data; NM - Not Measured

ANNEX

MIST BLOWER DATA

Unit Number	Performance Data					
	Lowest Discharge			Highest Discharge		
	Discharge, L/min	Noise Level, dB(A)	Fuel Consumption, L/h	Discharge, L/min	Noise Level, dB(A)	Fuel Consumption, L/h
1	1.05	ND	2.15	2.15	ND	0.87
2	0.56	103.0	2.54	11.5	103.0	2.07
3	0.46	103.0	2.28	11.5	103.0	1.96
4	2.92	112.0	6.27	15.0	113.0	1.90
5	0.96	103.0	1.97	11.0	103.0	1.43
6	2.43	101.0	6.72	11.5	101.0	1.04
7	0.03	104.9	3.12	11.5	105.3	1.51
8	0.10	86.2	3.52	12.0	86.7	2.20
9	0.24	85.7	4.37	15.0	85.7	1.66
10	1.32	92.0	4.85	11.0	94.0	0.74
11	1.49	101.2	4.64	14.0	100.9	3.03
12	1.32	92.0	4.85	11.0	94.0	0.74
13	3.22	91.3	3.31	9.8	91.5	0.59
14	0.02	97.6	2.99	NM	97.1	1.41
15	0.99	98.5	3.66	11.1	99.0	0.96
16	2.82	98.0	3.05	12.0	98.0	0,07
17	0.04	103.4	3.10	11.2	103.4	0.04
18	0.07	90.7	2.50	7.9	90.7	0.60
19	0.66	97.7	2.59	11.5	98.0	0.99
20	0.63	100.9	3.27	12.5	102.6	2.30
21	2.05	96.7	1.00	2.08	100.6	1.59
22	0.52	98.7	3.12	2.09	103.5	2.32
23	0.37	101.7	1.77	2.56	100.6	2.05
24	0.33	93.6	1.96	2.79	95.0	2.10
25	1.65	101.7	0.86	2.01	102.7	0.56

ND - No Data; NM - Not Measured

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