

## AFFORDABLE QUALITY

# FACTS & GENERAL INFORMATION ON VENTURI AIR BOOM SPRAYERS

# 27 and 40 Foot Widths



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GEARMORE INC.

## VENTURI Air Boom Sprayers

This booklet is designed to provide information on the many advantages of venturi air spraying and why, in today's environment, it is important to consider this spraying system.

In this booklet, we will go into great detail on venturi air spraying technology and how it relates to the GEAR-MORE VENTURI AIR BOOM SPRAYER.

The most common system of spraying is called "High Volume" or "Dilute" spraying. Using this spraying technique, the liquid is forced, under high pressure, through a small diameter orifice. Traditionally, high pressure boom sprayers and air blast sprayers all use this system to atomize the spray.

Another method of spraying has now been developed using a venturi tube to atomize the spray liquid. Air is passed through the venturi and the liquid is sheared into extremely fine and uniform particles. Now, the air becomes the carrier of the spray instead of high volumes of water; we call these sprayers Gearmore Venturi Air Boom Sprayers.

Laboratory tests show that there is a substantial difference in the size of spray particles between the two methods of atomizing the liquid. With the "High Volume", the droplets have a diameter of 250 to 300 microns. This size can not be reduced, even by using higher pressure. The Venturi Air Boom Sprayers reduce the liquid to diameters of approximately 50 microns, i.e. fog size. The difference of the particle size is extremely important. Unlike the "High Volume" spray, the particles from the Venturi Sprayer do not run together and drip off the plant. Much less water is used because the air is carrying the spray particles to cover the plant with a homogeneous fog like spray. We specifically designed the Gearmore Venturi Air Boom Sprayer as a fine micron droplet sprayer.

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## STATE OF THE ART SPRAYING

# **VENTURI AIR BOOM SPRAYERS**



### ADVANTAGES OF OUR VENTURI SPRAYING SYSTEMS

- Nozzles adjust to deliver spray directly on the crop
- Complete coverage in the target area
- Spray atomization is smaller and more uniform
- Even distribution of concentrated spray
- Better product utilization
- Less chemical waste and reduced soil/water contamination
- Simple, accurate metering system
- Venturi spraying means fewer fill-ups
- Low gallonage means reduced water damage on crops

### QUESTIONS & ANSWERS ON THE **GEARMORE VENTURI AIR BOOM SPRAYERS QUESTION:** Just how does a Venturi Air Boom Sprayer work? The distribution heads have built-in venturi tubes with a chemical tube in the center. **ANSWER:** The air, at speeds up to 200 miles per hour, literally shears the droplets to small micron size. **OUESTION:** How is this possible when you use a centrifugal pump at pressures of only 15 to 40 PSI? **ANSWER:** We only need enough pressure to get a steady flow of liquid to the distribution nozzles, the high speed air atomizes the liquid. How do you save on chemicals and water with Venturi Air Boom Sprayers? **QUESTION: ANSWER:** The remarkable atomization of the liquid allows the air from the sprayer to carry the tiny droplets in suspension form. These fog size (50 micron) droplets adhere to the plant surface and deposit the chemical on the foliage instead of dripping and running off on the ground. Also, our nozzles are adjustable to direct the chemical on the foliage, thus no wasted chemical. **QUESTION:** We must follow the "label" gallons per acre rate, so how do we save on chemicals? **ANSWER:** Until the chemical manufacturers lower chemical rates for low volume, you should continue to follow the label directions. However, since you will be achieving complete plant coverage, you will find that you will not have to spray as often. You could end up as much as doubling the time between applications. This would represent a 50% chemical savings, plus the other savings of tractor wear, fuel, labor, and soil compaction. **QUESTION:** Are there other advantages to Venturi Air Boom Spraying? **ANSWER:** Yes, there are many other advantages besides using less chemicals. There is less soil and water contamination, less container disposal, less exposure of personnel, etc. **QUESTION:** How can you get by using an average of 1/4 to 1/2 the amount of material that a liquid boom sprayer uses? **ANSWER:** Because of the small micron size we produce, a lot of liquid is not required to obtain total plant coverage. Page 3

## QUESTIONS & ANSWERS ON THE GEARMORE VENTURI AIR BOOM SPRAYERS

<b>QUESTION:</b>	Why is micron size important?
ANSWER:	The smaller the chemical droplet, the better the coverage. High volume sprayers put out micron sizes of about 300, low volume Venturi Air Boom sprayers about 50 microns. There are 216 - 50 micron droplets in one 300 micron droplet.
QUESTION:	Just how small are the 50 micron droplets you produce with the Gearmore Venturi Air Boom Sprayer?
ANSWER:	One micron is one millimeter divided by 1000, which equals .00004 of an inch. Thus, a 50 micron droplet is (.002) 2 thousandths of an inch, or about 10 times smaller than the period at the end of this sentence.
QUESTION:	If Venturi Air Boom Sprayers are so effective, why are some growers still using liquid boom sprayers?
ANSWER:	Growers generally resist change and if their crop has little foliage, they can get by with a liquid boom sprayer. However, if the crop has a lot of foliage and the pests are mainly on the underside of leaves, the grower usually switches to the Venturi Air Sprayer.
QUESTION:	My high pressure boom sprayer can be calibrated to apply low volume, so why should I change to a Venturi Air Boom Sprayer?
ANSWER:	It is true that some high volume sprayers can be adjusted to apply a low rate. The difference is the lack of uniformity of droplet size and the inability of the high volume sprayer to produce a significant quantity of droplets below 300 microns.
QUESTION:	Why, in many cases, do chemical companies recommend high volume spraying?
ANSWER:	Chemical manufacturers have had many bad experiences with improperly designed and poorly adjusted sprayers. They have found that by using higher amounts of chemicals and water to "flood" the plant, they can some what compensate for poor coverage. Also, it would cost chemical manufacturers a considerable amount of money to change the labeling of their products to include low volume rates. Most important to chemical companies, lower application rates means less sales and profits.
QUESTION:	Don't growers also like to see the chemicals running off the foliage?
ANSWER:	This is true, but under present environmental conditions, we feel it is no longer acceptable to "flood" crops. Also, it is a very uneconomical way of spraying.

### QUESTIONS & ANSWERS ON THE GEARMORE VENTURI AIR BOOM SPRAYERS (CONTINUED)

**QUESTION:** This may be true, but at low volume rates of say 25 gallons an acre, how do you tell you are getting coverage?

**ANSWER:** True, it is difficult to see the coverage with the naked eye, but it is on the foliage. You will see the liquid coming out of the sprayer, but you will **not** see liquid running off the foliage.

#### **QUESTION:** Why is there so much air hose tubing on your sprayers?

**ANSWER:** Due to the fact that crop rows vary in width, and as crops grow, positions of the nozzles sometimes need to be changed. The distribution nozzles need the flexibility to be moved up and down and in and out. This feature is critical to obtaining total plant coverage and is not available on competitive sprayers.

### **QUESTION:** We use a liquid boom sprayer and run at 100 to 300 PSI to get coverage, so why should we purchase your sprayer?

ANSWER: First of all, liquid boom sprayers are not designed for high pressure spraying. If you check your "Teejet" spray tips manual, you will note that most tips are designed for a maximum of 60 PSI. By using high pressure to try to obtain a fine spray, you will get a little better coverage, but it will not give you coverage on the underside of the leaves. By using liquid as carried under high pressure, you continually eat out the orifice disc, which throws off your application rates. Venturi air booms running at low pressure, using air as the liquid carrier, will give you total plant coverage.

### **QUESTION:** How long has the Venturi Air Boom Sprayer been manufactured and why was it developed?

**ANSWER:** 

Over 25 years ago, our manufacturer, CIMA in Italy, got a request from their distributor in Australia for a row crop air boom to control their serious white fly problem. White flies are difficult to control as they are mostly on the underside of leaves. Since, for many years, the CIMA vineyard and orchard sprayers were successfully placing chemicals on the underside of leaves, they felt the same technology could be used on row crops. Thus, the Venturi Air Boom Sprayer was born. The sprayer was a complete success and is sold worldwide.

### WHY SMALLER DROPLETS ARE MORE EFFECTIVE



For <u>each 300 micron droplet</u> formed by a conventional sprayer, a <u>Venturi Air Sprayer makes 216 fog</u> <u>sized droplets of 50 microns</u>. The enlarged drawing at left represents a 300 micron droplet in proportion to another droplet of 50 microns. Each is surrounded by a zone of 100 microns representing the effective kill zone of the chemical.

In the drawing at left, 216 droplets of 50 microns and one droplet of 300 microns are shown each surrounded by a kill zone of 100 microns. It can be seen that the 216 droplets of 50 microns cover a considerably larger area than the single droplet of 300 microns. This is why substantially less water is required to carry the chemical on to the plants when using Venturi Air Sprayers. The fine uniformly sized spray droplets assure excellent coverage. *This illustration gains impact because one gallon of liquid contains 268 million droplets of 300 microns and 58 billion droplets of 50 microns.* 



### Advantages of Venturi Air Boom Sprayers



Area of Venturi Effect Atomizer Nozzle Turbulence Effect

## COMPARISON CHART

FUNCTION	LIQUID BOOM SPRAYERS	VENTURI AIR BOOM SPRAYERS
System of Spraying	High pressure pump and disc nozzles	Low Pressure pump and venturi nozzles
Droplet Distribution	Carried by high liquid pressure	Transported homogeneous with air
Working Pressure	50 to 300 PSI	15 to 40 PSI
Chemical Utilization	Because of dripping, only 75% of chemical reaches the vegetation, while remaining 25% falls to soil.	No dripping, all of the chemical is used. Theoretically, mixture could have 25% less chemical. With the venturi air boom sprayer, chemical treatment is applied to a specific area. Air flow can be directed and adapted for various shapes and requirements of dif- ferent plants. The chemical is distributed evenly over the entire plant.
Foliage Coverage	Partial coverage, since larger droplet sizes and the large quantity of water used to "wash" the surface of the leaves, results in spotted, uneven coverage, and run off. Also, with this type of sprayer, the high liquid pres- sure tends to push the leaves against each other causing a "shingling" ef- fect. This makes it extremely difficult to get coverage on the underside of leaves and fruit blocked by foliage.	Liquid is atomized in fog size droplets, which remain in suspension with the air. All parts of the plant are touched by air and con- sequently chemical is distributed uniformly to all surfaces and in the more hidden posi- tions. Droplets are very small, so they stick to plant surfaces homogeneously and deposit the chemical instead of dripping and running off onto the ground.
Refilling Time	Requires a lot of wasted time refill- ing, thus tend to use larger tanks, which increase cost and soil compac- tion.	Uses 1/4 to 1/2 the amount of liquid, which means less fill-ups and more time spraying.
Servicing	High pressure pumps wear out sooner and require continuous maintenance. Discs and hoses wear out quickly under high pressure. The metering discs wear and spray volume changes over time. Constant testing and maintenance are required to maintain accuracy.	With Gearmore Venturi Air Boom Sprayers, the only service required is 2 grease points, oil in fan support and driveshaft. All parts in contact with the spray liquid are non-cor- rosive. The centrifugal pump requires little maintenance. The quantity of liquid sprayed stays constant field after field.

# FEATURES OF VENTUR





- Spray nozzles can be adjusted so air velocity at foliage can be set as low as 20 miles per hour.
- Air movement allows chemical to completely cover vegetation, especially the underside of leaves.
- Spray drift is reduced by 50% to 75%, compared to high pressure liquid boom.
- Sprayer can be operated in winds up to 20 miles per hour.
- Main drive and pump belt are automatically adjusted by spring loaded idler.

# AIR BOOM SPRAYERS



- Low pressure spraying system, 15 to 40 PSI spraying pressure means less maintenance for whole liquid system.
- Built-in overrunning clutch to protect the tractor and sprayer drive train.
- Reachable controls from tractor seat, allows operator to switch liquid from off to right, left or both sides spraying. Available in liquid or electro-valve control on all models.
- Boom has break-away and hydraulic fold-away features to prevent damage and for transport.
- Boom raises and lowers hydraulically for different crop heights, independent of the sprayer.
- Boom nozzles are completely adjustable in width and angle for maximum coverage.
- Chemicals only come in contact with plastic, rubber and stainless steel parts.

## FOR 3-POINT MOUNTED SPRAYERS



## 27' & 40' AIR BOOM SPRAYER SPECIFICATIONS

#### **FEATURES:**

TANK:	Translucent polyethylene 150 gallon with hatch and strainer basket.	1
FAN:	Centrifugal type with PVC housing	
AGITATION:	Adjustable liquid bypass, and air from	
	fan when required.	
PUMP:	Centrifugal with maximum 37 GPM.	
FILTRATION SYSTEM:	3 Stages; at filler, after pump, and at nozzles.	3
DRIVE:	540 R.P.M. PTO driven with belt drive	
NOZZLES:	to fan and pump with overrunning clutch. "No Drip" system on each nozzle and individual liquid shut off by hand	
CONTROLS:	Replaceable stainless steel discs and screens. Reachable from tractor seat allowing operator to switch liquid from off to right or left.	
SIGHT GAUGES: PRESSURE GAUGE:	In tank and tubing. In glycerine filled stainless steel case.	27' Boom (shown) Folds Up,

#### **SPECIFICATIONS:**

MODELS:	P50S-600-27	P55S1-600-40S	P55S1-600-40
Boom Width	27'	40'	40'
Rows:	8 Row	7 Row	12 Row
No. of Nozzles:	2 + 2 = 32	2 + 3 + 2 = 49	2 + 2 = 48
Boom Design:	Galvanized Tubing	Galvanized Tubing	Galvanized Tubing
Tank Capacity:	150 Gallon	150 Gallon	150 Gallon
Diameter of Fan:	19.75"	21.75"	21.75"
Fan (RPM):	4320	3720	3720
Volume of Air (CFM);	4875	8240	8240
Air Speed at Foliage:	10 - 50 MPH	10 - 50 MPH	10 - 50 MPH
Controls:	Electro-Valve	Electro-Valve	Electro-Valve
Minimum Tractor HP:	52	60	60
Weight:	1230#	1800#	1800#
Specifications Subject to Change Without Notice.			

40' Boom Folds Forward

### Special Standard Features Unique To Our Sprayer



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### Approximate Repair and Maintenance Costs

### GEARMORE VENTURI AIR BOOM SPRAYER VS. LIQUID BOOM SPRAYER

### **Over 7 Year Period**

OPERATION	*	VENTURI AIR BOOM SPRAYER	*	LIQUID BOOM SPRAYER
Repair leaking pump	2	Parts - \$120 Labor - 1 hr. x \$90 = \$90 Total Cost - \$420	4	Parts - \$331 Labor - 4 hr. x \$90 = \$360 Total Cost - \$2,764
Replace complete pump	1	Parts - \$524 Labor - 1 hr. x \$90 = \$90 Total Cost = \$614	2	Parts - \$1,500 Labor - 1 hr. x \$90 = \$90 Total Cost = \$3,180
Replace set of spray tips	2	Parts - \$120 Low pressure orifice discs, little wear	21	Parts - \$1,965
Repair and replace high pressure hoses	•	DNA - 15-40 PSI system Little or no cost, however air tub- ing can be damaged over time = \$350	*	Parts - \$350
Add and change oil in piston diaphragm pump		DNA - No piston diaphragm pump	•	Oil - \$50
TOTAL REPAIR COSTS OVER 7 YEARS		\$1,504		\$8,309

- \* Means the approximate number of times replacements made over the 7 year period, no labor was included on some repairs that can be performed by the tractor operator.
- Means the approximate total cost over the 7 year period.

DNA means the sprayer "Does Not Apply" to the repair operation.

The above chart is only to show the approximate repairs over a 7 year period. True repair costs will vary because of hours used, general maintenance performed, etc.

Study was based on 27' boom sprayers.

### VENTURI AIR BOOM SPRAYER ADVANTAGES OVER LIQUID BOOM SPRAYERS

#### LESS TIME IN THE FIELD

The Venturi Air Boom Sprayer will spray from 2 to 4 times longer between fill-ups than a liquid boom sprayer with the same size tank.

#### MORE CHEMICAL DROPLET PER ACRE

The Venturi Air Boom Sprayer will produce over 200 micro droplets for every spray droplet applied by a liquid boom sprayer.

#### **EVEN DISTRIBUTION OF CONCENTRATED SPRAY**

A continuous flow of air, thoroughly saturated with fog-sized droplets of spray, penetrates in and around all areas of each plant. The homogeneous mixture of air and spray liquid covers even the undersides of plants.

#### • COMPLETE PESTICIDE COVERAGE

The remarkable atomization of the liquid allows the air from the sprayer to carry the tiny droplets in suspension form. The fog sized (50 microns) droplets stick to the plant surface and deposit the chemical instead of dripping and running off onto the ground.

#### **BETTER PRODUCT UTILIZATION**

The chemical product is distributed entirely over the crop and stays adhered to the plants. Although other sprayers may claim low volume, the secret is in the atomization. Other sprayers emit irregularly sized large drops (up to 250 times larger) that run together, drip and run off the plants surface to the ground. Spray run-off equals 25% wasted material.

#### NOZZLES ADJUST TO DIRECT SPRAY ONLY ON CROP

Most sprayers are broadcast type, allowing at least 25% of the chemical to be directed toward bare ground. The Gearmore Venturi Air Boom Sprayers nozzles are completely adjustable (360 degrees) so they direct all of the spray at the plants. With nozzles set at an angle and powerful air turbulence, chemical coverage of the complete plant is obtained. Row spacing is easily adjusted without tools.

## TESTIMONIALS

"I bought my first Gearmore Air Boom Sprayer for strawberries 12 years ago, and it gave us the total plant coverage we were looking for. That first year was very wet and 40 acres of our celery developed a severe blight. My father told me to disc it up, as he felt it was impossible to save. I suggested we first try our air boom sprayer. Happily we were able to save the whole crop. The celery crop grossed \$200,000, so needless to say, we purchased a second Gearmore Air Boom Sprayer. We have had similar success with the Gearmore Air Boom Sprayer on our strawberries, cabbage, and beans."

> AG Kawamura Orange County Produce Irvine, CA

"We have been operating Gearmore Venturi Air Boom Sprayers for 15 years and have recently purchased our third machine. Our oldest has sprayed approximately 20,000 acres with little maintenance. The Gearmore Air Boom Sprayers give better coverage and spray twice as many acres per day as our liquid boom units."

Dick Brucker Chemical Applicators Ag Rx Corporation Oxnard, CA

"The Gearmore Venturi Air Boom Sprayer is the only ground sprayer I have ever used that provided 100% control of the white flies. Of course, they come back, but at least I get a reprieve. I used it on my fall cantaloupe field and found it to be 100% effective. I would certainly recommend this sprayer to anyone having a white fly problem."

> Jim Vedder Row Crop Grower El Centro, CA

"I purchased my first Gearmore Venturi Air Boom Sprayer in 1991. We needed to deliver material under watermelon leaves in a uniform manner, because of a serious white fly problem. The effectiveness of the air boom saved our crop. Since that time we have purchased two additional units of similar configuration. These sprayers have covered more than 25,000 acres with very little maintenance or down time. We have been very happy with the Gearmore Venturi Air Boom Sprayers"

> Larry Jefts Larry Jefts Farm Kunia, HI

### Venturi Air Boom Sprayer Cost Savings

The Gearmore Venturi Air Boom Sprayer reduces your spraying costs over liquid boom sprayers in four ways:

- 1. Less time in the field: You will be using  $\frac{1}{4}$  to  $\frac{1}{2}$  the amount of liquid, so your costs will be reduced by approximately 50%\*. Less fill-ups means more production.
- 2. *Less maintenance:* Venturi Air Boom Sprayers have fewer parts and operate at low liquid pressure. Thus, your maintenance costs are only 20% of the costs on higher pressure liquid boom sprayers.
- **3.** *Less spraying:* You obtain total plant coverage with Venturi Air Boom Sprayers. This will increase timing between spraying, thus reducing the number of applications required. This should eliminate at least one spraying per year.
- 4. *Higher yields:* Normally obtainable as total plant coverage should produce a bigger and better crop. However, no large scale studies have ever been done to definitely prove percentages of yield increase, so no dollar amounts will be used in this study.

Using the information above, we will show you an example of the savings obtainable based on 100 acres. Put in your numbers to calculate your savings.

#### 1. Less time in the field:

Application cost, for labor, per acre  $\frac{12.00}{2}$  X number of acres <u>100</u> X number of applications per year <u>5</u> =  $\frac{100}{2}$  Solve the field =  $\frac{100}{2}$  Solve the structure of applications for the field =  $\frac{100}{2}$  Solve the structure of applications for the field =  $\frac{100}{2}$  Solve the structure of applications for the field =  $\frac{100}{2}$  Solve the structure of applications for the structure of a s

#### 2. Less maintenance:

Using the maintenance chart on page 14, the yearly cost savings is  $\frac{972}{2}$ .

#### 3. Less spraying:

Chemical cost per acre \$50.00 plus application costs per acre \$12.00 = \$62.00 X 100 acres = total cost \$6,200. (Based on one less application per year)

Gearmore Venturi Air Boom Sprayer savings (1)  $\frac{3,000 +}{2}$  (2)  $\frac{972}{5,000}$  = Total Yearly Savings of  $\frac{10,172}{5,000}$ 

\*This percentage will vary based on how efficient your "nursing" operation is.

### INFORMATION NEEDED TO PRICE A VENTURI AIR BOOM SPRAYER

Now that you have studied the information in this booklet, perhaps you have convinced yourself that it is time to purchase a Gearmore Venturi Air Boom Sprayer.

Before your local dealer can provide you with a quote, a few questions must be answered regarding your sprayer needs.

My tractor horsepower is: 1. My row width is: (A) 2. I want to spray rows. 3. The number of crop lines per bed are: 4. 5. My crops are: А

We hope this booklet gave you a better understanding of Venturi Air Boom Sprayers.

For more details and a demonstration on our Air Boom Sprayers, please contact the dealer listed below.

Specifications Subject To Change Without Notice

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