



ECO
AGRO SERVICES



Electrostatic Spraying System (ESS)



Electrostatic Spraying Systems ,Inc,USA(ESS) manufactures wide range of Electrostatic Sprayers for Horticulture and Row Crops. The heart of the air assisted electrostatic sprayer is the patented "Air Atomising Induction Charging-MaxCharge Nozzle",which was invented by Dr.Edward Law of the University Of Georgia. ESS sprayers are being used in most Grape growing countries of the world for Table as well as Wine Grapes to spray Pesticides and PGRs.

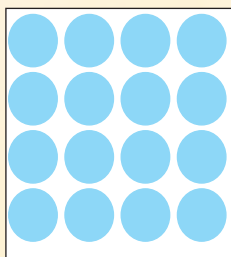
ESS Electrode

Dust is a bad conductor of electricity. ESS utilises a embedded induction ssystem , which protects the charging electrodes from dust.Dust is intrinsic to agriculture and a contact charging ssystem (open electrodes) gets coated with dust in a matter on minutes , reducing charging efficiency drastically. Embedded electrode (ESS) is safe and totally reliable. ESS provides charge measureing meter (Multimeter) to measure charge of each nozzle.so charging of each nozzle indicates that they have proper charge to work or not.



Droplet Size

Small droplet means greater coverage. The droplets delivered by ESS are of 30 to 40 μ . The charged droplets donot coalesce to form bigger droplet and form extraordinary bond with the leaf surface. The drops are so small that the leaf does not become wet. Scientific studies have found that particles deposited on leaf by dislodged by ESS sprayers are not friction or contact with human body.



Droplet Size

Droplet Size	No.of droplets per sq.inch.
30 Micron	42570
40 Micron	17931
50 Micron	9224
60 Micron	5289
100 Micron	1164
130 Micron	530
300 Micron	43

For Comparison

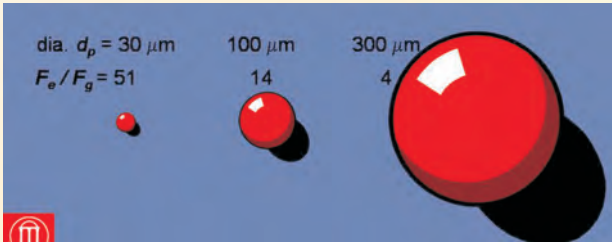
Size Of human hair	100 microns (dia)
Size of bacteria	0.2 to 20 microns
Size of fungi	1-100 Microns
Eye of the Needle.	1200 Microns

Charge to Mass Ratio

a) Droplets having small mass can have very high charge. For eg. Droplet of 30 μ will have a charge of 51, a droplet of 100 μ will have

a charge of 14 and a droplet of 300 μ will have a charge of only 4

- b) Due to very high charge, the attraction of leaf for the droplet is so strong that droplets can reverse direction, going 75 times against the force of gravity. That is the main reason why ESS delivers such a fantastic underleaf / wrap around coverage.



- c) The rate of Flow of liquid from nozzle is very important. In the ESS nozzle the flowrate of liquid is only 125 - 140 ml/min. Therefore highly charged

droplets are delivered from each nozzle. If the flowrate is 100 ml/min and Multimeter shows readings as -12 μ A then Charge to Mass Ratio is 7.2 mC/Kg

- d) **Importance Of Negatively Charged Droplets-** ESS Sprayers create Negatively charged droplets, which are attracted by the Positively charged leaf. A negatively charged droplet means it has a large number of Electrons, whereas a positively charged droplet means a deficit of electrons. While airborne It is also possible to create positively charged droplets using the Electrostatic charging technology, which will be attracted by the Negatively charged leaf. However it is important to remember that during the time it is airborne, the droplet comes in contact with air / humidity. Whereas the positively charged droplet gains electrons, and become less positive, No electrons are given off to air / humidity by the Negatively charged droplet as is used in ESS Sprayers.

Charge

12000 v at the the electrode, but has almost no amperes, so cannot be a hazard. In general, nozzle shows minimum charge of -16 μ A. However at most times a clean Nozzle will show more charge i.e between -20 to -30 μ A.



Integrated Nozzles

Charged droplets and large volume of Air is given out from the integrated nozzle itself. Since air is delivered from the nozzle itself, it is focused on the canopy immediately in front of it.

Low Pressure System

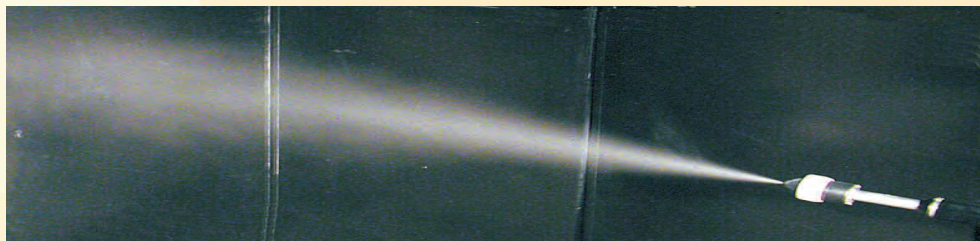
The air pressure used is just 15 psi, which means that the leaves or flowers are not damaged by blast of high speed air.

Penetration into Canopy

The large volume of air (7 CFM nozzle) gently pushes out the

existing air in canopy and replaces it with air containing charged droplets Penetration deep into Canopy is thus ensured. As the cloud of charged droplets get closer to canopy, the leaves attract the droplets and thus 100% coverage / deposition is ensured.

SuperCharger



ESS utilises a hitech Supercharger to deliver 98 CFM of air at low pressure to the nozzles. Due to Supercharger, spray goes higher and further (upto 15-20 feet).

Adjustable Booms

ESS has designed booms which can be lowered or raised and also positioned from horizontal to almost verticle for best coverage. Booms are flexible and will not break if it hits angle , wire or vine. Each boom can be turned ON and OFF individually.

Narrow Angle Of Spray from nozzles

In Ordinary Nozzles, the spray angle is about 60°. but in ESS Mazcharge Nozzle the spray angle is only 15-18°. Thus, the spray from ESS nozzle does not spread out , ensuring complete but penetrates and ensures excellent coverage / deposition.

Nozzle

Nozzles are easy to open and require no tools. Just twist to open. They are also easy to clean .

Ceramic Tipped Nozzle Covers

Ceramic Nozzle means Long Life . Nozzle Covers last from 3000-4000 hours, and are to be replaced after spray pattern is seen to be changed. Replacement of nozzle cover costs Rs2500- 3000 / nozzle

105 kg dry weight, 220 kg with water

Light weight , Easily moves through wet soil. Position on 3 point Hydrulaic makes it easy to manuvour.

Pesticides usage and number of sprays are reduced.

Any formulation of pesticide can be used. Due to superior coverage & no run off , less pesticide(upto 40 % less) can be used. Pesticides are to be sprayed @ 24lit acre and PGR @ 32 lit acre. Since the coverage and deposition is fantastic, the number of peaticide sprays is greatly reduced. It is possible to substitute expensive Systimics with low cost contact pesticides. Since use of Stickers- spreaders is not required,

expenses are further reduced. ESS Sprayer can be used to spray any pesticide, micronutrient, soluble fertilizer and stimulants etc. (Except HCN, and weedicides)

Saving in Fuel, Labour

Since very little water is used, more area can be treated per day, which means saving in fuel and labour. Depending on length of row and row width, it will take approx 22 mins to spray pesticide and 32 min to spray PGR per acre.

Temperature and spraying limitations

Can be used after rain, at night or early morning and even in afternoon, when temp is above 30-32° provided there is good humidity (> 60% in air). If temperature is higher or Humidity is lower, spray during late evening or Early morning. Refer to delta T table to find optimum spray time or to know when spray should be avoided.

Maintenance

- 1) Cleanliness is the most important maintenance. Flushing out pesticides and spraying clean water at end of day is must.
- 2) Gear oil change 1st at 25 hrs and there after every 500 hrs. Cost Rs 100/ change
- 3) Supercharger oil change every 1000 hrs. Oil change required for 2 changes provided with sprayer. Means no expenditure till 3000 hours.
- 4) Air Filter are not to be cleaned at all. They are self indicating and need to be replaced with Extra Air filter already provided with sprayer.

Tractor required and HP

Any tractor having 24 HP or more can be used. Sprayer requires 540 RPM PTO and speed setting at 2000 RPM

Calibration Kit/ spares

Calibration kit to measure flow rate of water from Nozzle and Instrument to measure charge of nozzle provided with sprayer.

Detailed Manual

Provided In English as well as in Marathi

Air switch(safety device)

Provides charging to nozzles only after air pressure of 5 psi is delivered from nozzle

Air pressure gauge / Liquid pressure gauge

These meters show air pressure and liquid pressure in PSI. These meters are for controlling the liquid flow and air flow and are used to

adjust the volume / acre .

Agitator

Provides vigorous agitation to pesticides in tank so that there is no settling. The speed of agitation can be changed if required.

LED indicators

To show that charging system and charging to nozzles is working properly.

Drift

Despite the small size of droplet, the ESS charged droplets are strongly attracted by leaf and therefore not lost to drift, unlike uncharged small droplet sprayers.

Warranty

ESS warranties free replacement of parts for manufacturing defects for one year.

Claims and Evidence/ Proof

1. Droplet size: Test Report from USDA , USA regarding size of Droplet 30-40 μ

2. Charge : Charge can be measured in field with the help of Multimeter as provided by ESS.

3. Air Volume from Nozzle: We have instruments to prove the discharge of air volume (CFM) from each nozzle

4. Coverage and deposition : Using UV Fluroscent Dye and UV light , we can prove the coverage/ deposition / penetration in canopy and even spread of droplet .

5: Workers safety: Scientific trials carried out in leading Universities.(Articles available on request)

6: Efficacy : Data from numerous International articles available

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