# Effervescent atomization in the agriculture sector

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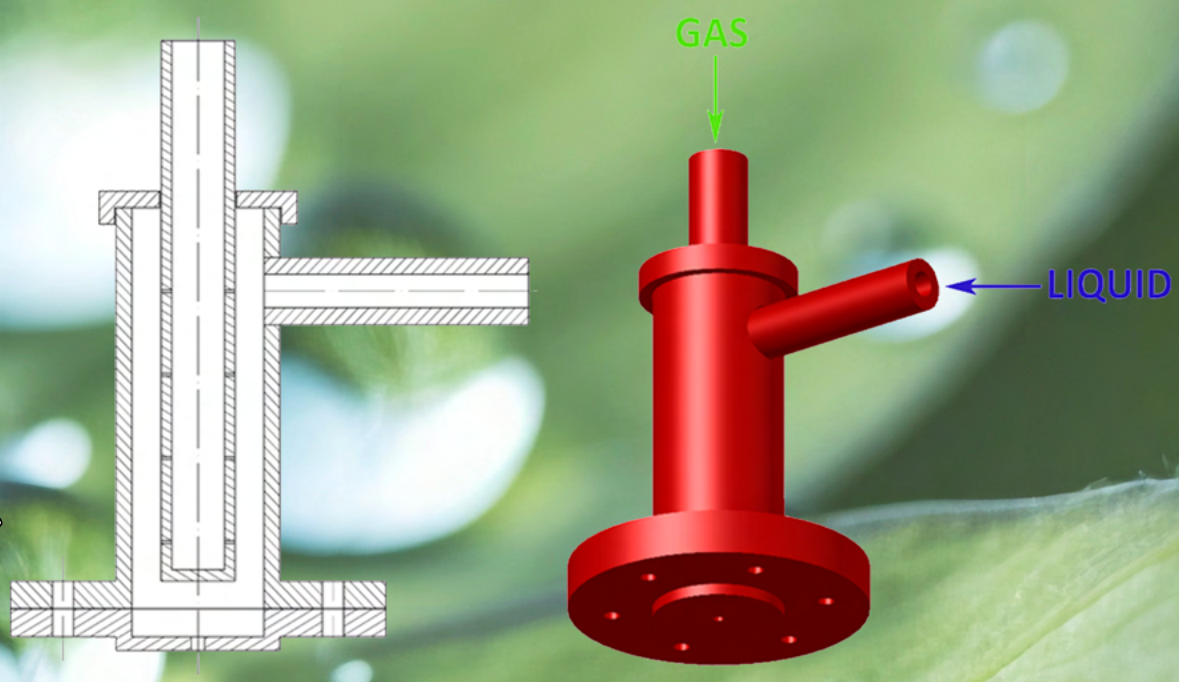
## Introduction

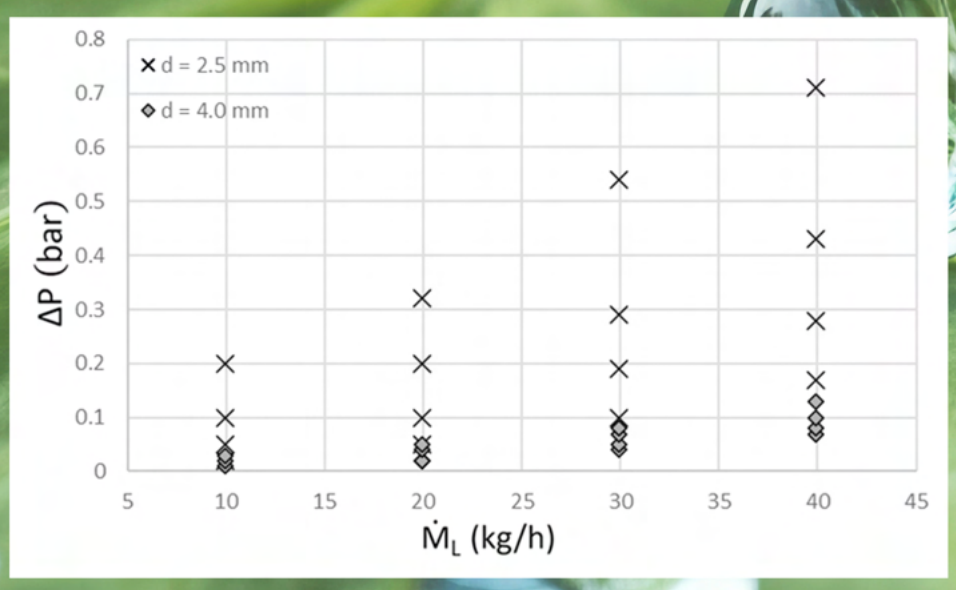
Effervescent atomization in the agriculture sector. The atomization process is used in industry for wetting bulk materials, and also in scrubbers and washers. A special type of spraying is effervescent atomization. Gas is introduced into the liquid in order to break it into small fragments. This type of system has been successfully implemented in gas turbines, combustion engines, furnaces, boilers, and waste incineration plants. It has also been used in atomizers for consumer products. In this article, the authors will focus on the use of effervescent atomization in the agricultural atomizers that are used to spread plant protection products.

## Construction

A simple structure, which consists of a body, nozzle and aerator, ensures reliable operation and easy maintenance. To carry out the tests, the authors' own design of an atomizer with replaceable nozzles was used. The individual elements of the nozzle were made using 3D printing. Flat nozzles with outlet opening diameters of 2.5 mm and 4.0 mm were used. The ratio of the diameter to the length of the outlet opening remained the same and was equal to 1. The aerator had 8 openings with a diameter of 1.1 mm.




## Results




During the tests, liquid and gas pressure drops were measured, and images were recorded using a set of devices equipped with a stroboscopic lamp. The volumetric flow rate of the gas varied from 0 to 2.5 $m^3/h$, and of the liquid – from 10 to 40 l/h. The measured values of the pressure drops at given flow rates enabled the relationship between the pressure drop at the atomizer and the mass flow rate of the liquid to be determined.

## Conclusions

Regardless of the outlet diameter, a greater volumetric flow rate corresponded with a greater pressure drop. By enlarging the outlet opening, the pressure drop in the atomizer decreased. Lower operating pressures were achieved in the effervescent atomizers when compared to the jet atomizers. This affects the efficiency of the pumps that should be used for a given type of atomizer. Lower pressure means a smaller loss of pressure when transporting fluid from a tank to an atomizer. To sum up, effervescent atomizers allow for a reduction in the operating costs of the devices that are used to apply plant protection products. They also enable water of lower quality to be used, and reduce the time that is needed to perform agrotechnical treatments.

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