

# mini-Wobbler® Testimonial



## The mini-Wobbler® is the best:

German research study compares several applicator technologies - Senninger mini-Wobblers outperformed the others!

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*(Products provided by Joinature Gartentechnik)*

## Research Study Overview

In this technical work, five different technologies were examined with regard to uniformity and wind drift -- micro sprinkler, rotators, impact sprinklers, oscillating sprinklers, and the mini-Wobbler; an unusual system in Europe.

In the study, a single head of each of the applicator types was examined and revealed the precipitation rate was higher in the area close to the sprinkler head than the outer edges of the distribution area. Regarding uniformity, it appeared this unequal distribution can be compensated by overlapping. Regarding wind drift, there were big differences in the various sprinkler types.

The impact sprinklers were more affected by wind than all other examined systems. In all examinations, the Senninger mini-Wobbler was the best sprinkler in the study. There are potential water savings that can be realized using mini-Wobblers for irrigation.

UNIQUE DESIGN

Wobbler technology, while not yet widely used in Europe, is totally different in its method of water distribution. Instead of distributing water as a fan type spray or through a fixed nozzle onto an oscillating arm, the stream is directed at the center of a rotating deflector. Based on the water pressure, the rotating grooved deflector distributes consistent sized droplets in a circular area. In the center of the distribution area, there is more water than in the outer area. Using multiple Wobblers with head-to-head spacing in rows, very high uniformity of distribution is reached.

The inverted model of the mini-Wobbler mounted along the top ridge of foil tunnels is ideal for tunnels with wall heights of 5 ft (1.5 m) or more. Using the inverted model allows unobstructed cultivation inside the greenhouse. When the foil cover is removed from the tunnel in spring, which is done regularly in Germany, the irrigation is not affected.

The upright mini-Wobbler is often used for container crops of all types or in field irrigation. The main lines and laterals can be buried or above-ground utilizing tees or saddles. Even higher flexibility can be reached with PE hose main lines and laterals (similarly to those used in fire departments) instead of a solid set installation. This portable method uses a Riser Adapter Assembly to connect the mini-Wobbler to the lateral using a 3 ft (1 m) section of 0.345" tubing and barb connection. The mini-Wobblers are then mounted on the riser adapter onto either a steel rod or PVC stake. This assembly allows easy relocation of applicators from one field to the other.



Upright mini-Wobbler used for container plants or field irrigation.



### Manufacturer Statistics for the mini-Wobbler:

- Flows upright: 0.42 to 2.61 gpm (95 to 593 L/h)
- Flows inverted: 0.75 to 2.61 gpm (170 to 593 L/h)
- Pressure upright: 15 to 25 psi (1.03 to 1.72 bar)
- Pressure inverted: 20 to 25 psi (1.38 to 1.72 bar)
- Diameter upright: 26.6 to 43.5 ft (8.1 to 13.3 m)
- Diameter inverted: 30.0 to 37.0 ft (9.2 to 11.3 m)



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## TEST SET-UP

Senninger mini-Wobblers were set up on the corners of a square test grid 20 ft by 20 ft (6 m by 6 m). Water arrived at the test grid through ¾" PE hose. A water meter and a pressure regulator were mounted at the inlet of the test grid to monitor flow and pressure. The run cycle was 12 minutes. Water was collected in catch cans placed at 3 ft (1 m) increments within the grid to determine the distribution uniformity and overall precipitation rate.



## DISTRIBUTION UNIFORMITY

The catch can data showed a relation of the water pressure regarding distribution. While in 30 and 20 psi (2.1 and 1.4 bar), the CC values of 91.9% and even 93.8% were reached, the uniformity dropped to 85.2% at 15 psi (1.0 bar).

A certain pressure loss is anticipated based on pipe diameter and pipe length. Even in correct calculation of pipe sizes, a pressure loss of 10% to 20% is normal for longer distances.

In the case of the mini-Wobblers, with an inlet pressure of 30 psi (2.1 bar), a pressure loss would improve the distribution uniformity at the end of the lateral. The mini-Wobbler performed best at 20 psi (1.4 bar)

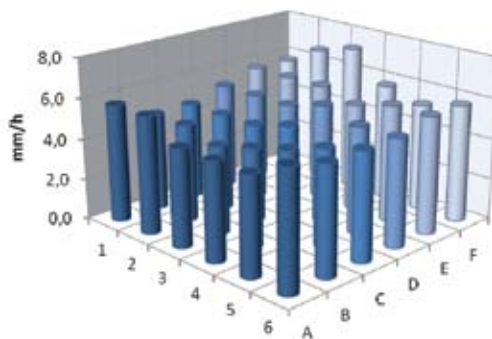
As anticipated, overall flow declined at lower pressures. The total flow of the grid per 12 minutes irrigation was 42.8 gal at 30 psi (162 liter at 2.1 bar), 37.2 gal at 20 psi (141 liter at 1.4 bar), and 29.1 gal at 15 psi (110 liter at 1.0 bar). The covered area was 3444 square feet (320 square meters).

A peculiarity of the mini-Wobbler is in how it distributes the water. While in wide range systems under high pressure with relatively large nozzles, large droplets are produced. The medium sized droplets from the mini-Wobblers produce a soft rain-like application. Also the relatively flat trajectory and spacing reduces the risk of surface sealing. Unlike other sprinklers with heavy coverage near the head, mini-Wobblers can be installed directly in the crop.

## IMPACT OF PRESSURE

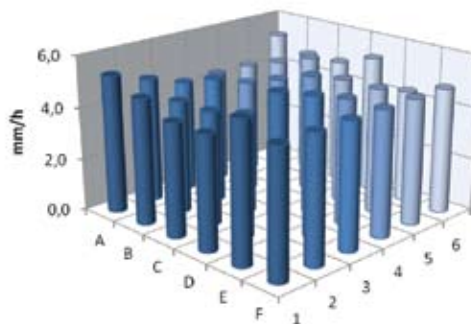
The influence of pressure on the distribution uniformity was examined. When using low pressure, the examination could only be made for the mini-Wobblers, as other types of sprinklers used in the examination need more than 50 psi (3.5 bar) for operation. Operating in the low pressure range of 15 to 30 psi (1.0 to 2.1 bar), the use of three different pressure regulators - 15, 20 and 30 psi (1.0, 1.4, and 2.1 bar) - were tested with the inlet pressure of 50 psi (3.5 bar).

At 30 psi (2.1 bar), a precipitation rate of about 0.197 to 0.276 in/h (5 to 7 mm/h) was measured. The CC was calculated by standard rules at 91.9%.



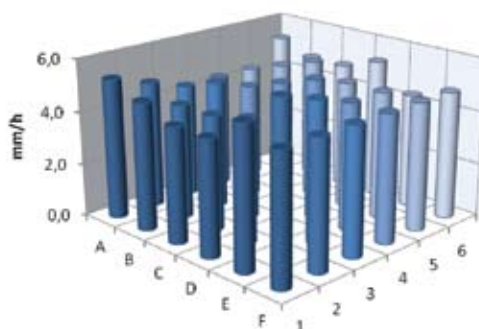
Inlet pressure of 2.1 bar: Catch can measurement in a square grid calculated the density using the Christiansen-Coefficient for distribution uniformity of mini-Wobblers. The heads were mounted in the corners.

At an inlet pressure of 20 psi (1.4 bar), the precipitation rate dropped to about 0.157 to 0.197 in/h (4 to 5 mm/h). This great uniformity can be seen below. A CC of 93.8% reflects this impression again.



Inlet pressure of 1.4 bar: Catch can measurement in a square grid for calculate the density using the Christiansen-Coefficient for distribution uniformity of mini-Wobblers. The heads were mounted in the corners.

At the low pressure of 15 psi (1.0 bar) shown below, distribution became less uniform. The measured precipitation rate was 0.118 to 0.197 in/h (3 to 5 mm/h), a wider range. The reduction of 5.8 psi (0.4 bar) caused a 8.6% drop in uniformity to 85.2%.



Inlet pressure of 1.0 bar: Catch can measurement in a square grid for calculate the density using the Christiansen-Coefficient for distribution uniformity of mini-Wobblers. The heads were mounted in the corners.