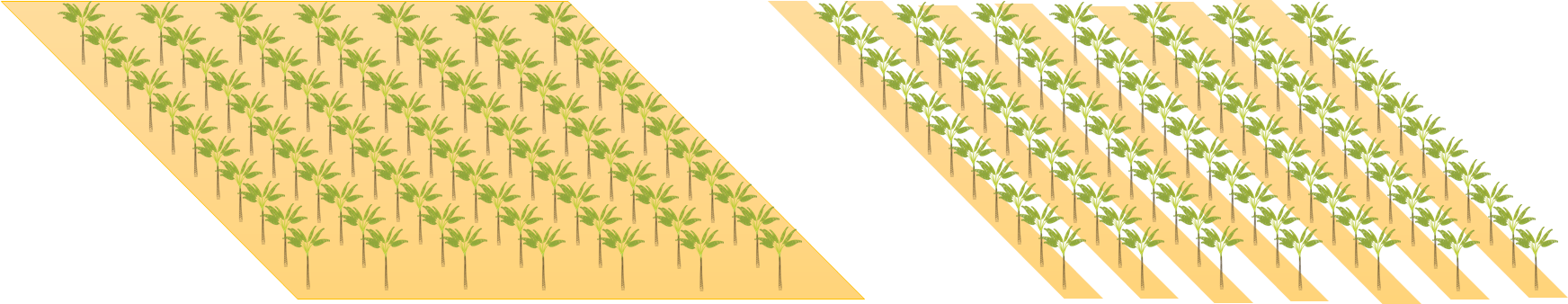
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| ***Field: Agroproduction***  **BROCHURE**  **Calibration of Field Sprayers**  Image-14          **Author: Dr. Fatih BARUTÇU**  **2017**  **Boosting Adult System Education In Agriculture - AGRI BASE**  **Erasmus+ K2 Action Strategic Partnership** |

# CALIBRATION OF FIELD SPRAYERS

Items needed for calibration of field sprayers are:

* Measuring tape,
* Chronometer,
* Collection tube,
* Flags or markers,
* Calculator and,
* If needed, catalog of sprayer nozzle.

While making calibration, ıt should be noted that spraying is broadcast (overlap) or band performed (Figure 1). In broadcast applications, working width is taken as a working width of the spray bar. In band applications, bandwidth, is considered to be working width.



(a) (b)

Figure 1. Broadcast spraying (a) and band (b) spraying applications.

**Calcuation of application rate while calibrating for broadcast spraying application**

Where:

N = Sprayer application rate (l/ha)

Q = Average nozzle rate (l/min)

B = Working width (m), and

V = Travel speed (km/h)



*1- Calculation of nozzle rate (Q) (l/min)*

Nozzle rate is the amount of liquid sprayed by a nozzle in a minute.

Where:

Q = Total nozzle rate (l/min)

q = Flow rate of a nozzle (l/min)

n = Total number of nozzles



Measuring cups and a chronometer are necessary to find the liquid sprayed in a minute by all the nozzles of sprayer. (Figure 2).

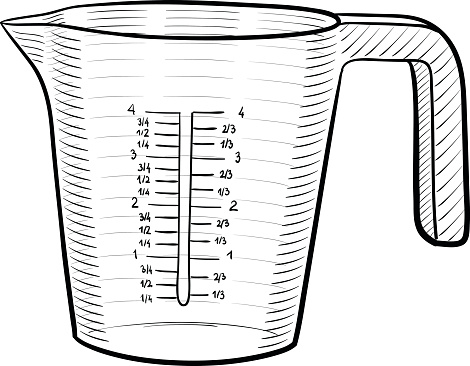


Figure 2. Measuring cup and chronometer

In order to determine nozzle rate; measuring cups is kept under the nozzles for a minute (Figure 3). This process is repeated two or three times. Average value obtained gives the total nozzle rate. The value founded divided by the total number of nozzles and flow rate of a nozzle is founded.

While measuring nozzle rate, sprayer pressure must be controlled and set to a value appropriate for the type of the nozzle.



While measuring the nozzle rate of sprayer, spray pressure should be noted. If the spray pressure correspond to the flow rate obtained is known, it is possible to calculate a spray pressure value for new flow rate value. For this, the following equation is utilized.



Where:

P = Spray pressure (bar),

k = Coefficient (unit-less) and

Q = Nozzle rate (l/min).

Figure 3. Measuring nozzle rate

Example Problem:

As a result of measurements, it is obtained 1.5 l/min nozzle rate at 3 bar pressure. However, application rate of a nozzle calculated is needed to be 2 l/min. In this case, in order to obtain 2 l/min nozzle rate what the new spray pressure should be set?

Solution:

*2- Calculation of travel speed (V) (km/h)*

In order to calculate travel speed, firstly the speed at each gear level must be known. Then the speed and gear level appropriate the spraying is selected. İt is suggested that the travel speed should be between 2 and 8 km/h.

Where:

V = Travel speed (km/h)

X = Distance (m)

t = Time (s)



In order to find real ground speed mark the distance of minimum 100 m and time the number of seconds it takes to travel this distance. (Figure 4). The distance is divided to the time obtained and thus the real ground speed is found.



100 m

Figure 4. Ground speed test.

Travel speeds at different gear levels

1. Gear ……………. (km/h) Distance : ………. (m) Time : ……….. (s)

2. Gear ……………. (km/h) Distance : ………. (m) Time : ……….. (s)

3. Gear ……………. (km/h) Distance : ………. (m) Time : ……….. (s)

*3- Calculation of working width (B) (m)*

In order to find working width of sprayer simply multiply the number of nozzles by the distance in meter between each nozzle

Where:

B = Working width (m)

m = Distance between two nozzles (m)

n = Number of nozzle



**Calcuation of application volume for band spraying**

Where;

N = Application volume of sprayer (l/ha)

Q = Flow rate of a nozzle (l/min)

B = Band width (m) and

V = Travel speed (km/h)’.

