



Stage specific Ultrasol® Cebolla formulas in Mexico triple profit by increasing proportion of large size onions from 46% to 66%

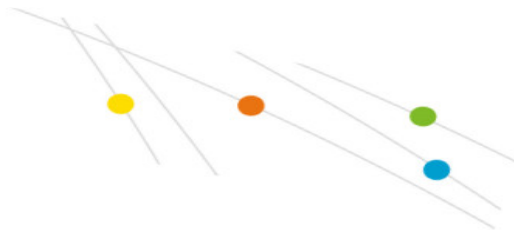
On a global scale, Mexico is among the top 10 producers of onions for fresh consumption, and onions are the 5th important vegetable crop in the country. Production aims both for the domestic market – to satisfy a per capita consumption of 9,9 kg - but Mexico is also among the top 5 of global exporters of onions.

Onion is a major crop in 10 states in Mexico. The demonstration trial described here was conducted in the state of Morelos, where 5000 ha of onion are grown, with an average yield of 30 MT/ha, and 20% produced for export. The farmer involved in the trials is one of the technically more advanced of this area, and interested to improve the quality of his produce. Additional demonstration trials were done in the neighboring state of Puebla.

The quality of onions increased to benefit the farmer without deviating too strongly from current practice.

Ultrasol® Cebolla provides in a single bag, the right proportion of NPK and micronutrients.

By application of the SQM programme the financial revenue was tripled compared to the farmer's practice, by achieving 20% higher yield of top-size class bulbs with only 5% added on the total production costs.



All nutrients / Todos los nutrientes



**Making it easy for farmers to
use balanced nutrition**

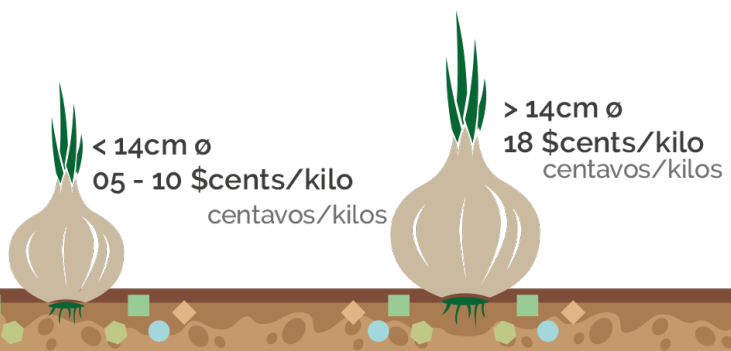
Facilita a los agricultores utilizar
una nutrición equilibrada

Single bag

Una sola
bolsa

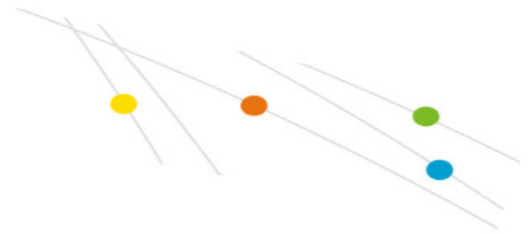


+20 % high value onions
+20% cebollas de alto valor



Observations of the currently practiced nutritional management of onion showed that the application of conventional granulated fertilizers does not meet the crops demand for nutrients. Onion has a high requirement for nitrogen and potassium which is not adequately supplied with traditional fertilization. In most areas growers traditionally use mostly urea and chloride containing fertilisers. Additionally, the use of micro-nutrients is not common practice in Mexico, lowering the yield potential of the onion crop.

SQM Mexico focused on the development of nutrient programmes with a better fit to the onion yield potential, aiming for onion growers who are interested in high quality produce, and who use fertigation. As result two stage specific formulas: Ultrasol[®] Cebolla Crecimiento (20-10-10+2,6MgO) and Ultrasol[®] Cebolla Finalizador (7-12-40+2,2MgO). The aim of the development was to provide in a single bag the right



proportion of NPK and a balanced amount of micro-nutrients, facilitating farmers to use balanced nutrition on relatively small fields, with average size of 3 to 5 ha.

The programme includes use of Fe HBED 6% suited for the local alkaline soil (pH 7,5-8,8) and water (pH 7,4- 8,5) conditions. Addition of Mg and Ca, and micro- elements Fe, Zn, Boron contribute to a better visual colour of foliage and development of the crop and a healthier crop with lower recurrency of dominant diseases like leaf blight (*Stemphylium* spp), or downy mildew (*Peronospora destructor*).

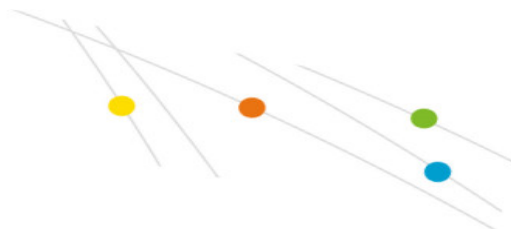
The trial was carried out by Alinne Palacios, agronomist of SQM Mexico, zone, with a producer in Tepalcingo, Morelos. In the farmers field, 1 ha was kept under farmer's nutritional management, and on 1 ha SQM's programme was applied, including the two stage specific Ultrasol[®] Cebolla formulas (Table 1). The field was manually planted at a density of 250.000 seedlings/ha in double rows with white onion Var. 4043 Seminis, a hybrid variety.

At harvest, the total yield of the two fields, and the proportion of the different size classes was determined. Additionally, to show an effect on shelf-life, two comparable samples of 10 large/colossal sized onions were put in plastic bags and stored refrigerated at 4° C for a period of 21 days. It was noticed that the bags with onions from the farmer's practice contained much more condensed moisture, and it was necessary to replace the bags in the course of the trial to avoid fungal growth.



A professional photographer took pictures and recorded a video presenting the testimonial of farmer Julio Castañeda Reyes on his positive experience of collaboration with SQM and the benefits brought by use of the Ultrasol[®] formulas.

Table 1. Nutrient programme for onion demonstrating the benefit of Ultrasol[®] Cebolla onion crop and stage specific formulas.



| Crop stage (days after transplant) | Number of applications | SQM | | Farmer | |
|------------------------------------|------------------------|--|--------------------|-------------------------------------|--------------------|
| | | Formula | Fertiliser (kg/ha) | Formula | Fertiliser (kg/ha) |
| Establishment (0-20) | 4 | Ultrasol® Inicial (15-30-15+1MgO) | 50 | Ultrasol® MAP-T (12-61-0) | 50 |
| Leaf growth (21-45) | 12 | Ultrasol® Cebolla Crecimiento (20-10-10+2MgO) | 223 | Phosponitrate (33-3-0) | 252 |
| | | Calcium nitrate (15.5-0-0+26,5CaO) | 72 | - | - |
| Bulb formation (46-80) | 18 | Ultrasol® Cebolla Finalizador (7-12-40+2,2MgO) | 90 | Phosponitrate (33-3-0) | 240 |
| | | Calcium nitrate (15.5-0-0+26,5CaO) | 72 | Calcium nitrate (15.5-0-0+26.5 CaO) | 75 |
| Bulb maturation (81-100) | 8 | Ultrasol® Cebolla Finalizador (7-12-40+2,2MgO) | 144 | Potassium sulphate (0-0-52+18S) | 192 |
| Total kg/ha | | | 729 | 809 | |

Additionally in the SQM programme, Ultrasol® Micro Boro and Ultrasol® Micro Mix were applied weekly (1-2 kg/ha/week) and in the farmer's practice, foliar applied liquid fertilisers were applied monthly during the first 50 days.

Table 2. Yield results.

| Size class | SQM Ultrasol® Cebolla | | Sales value (USD/ha) | Farmers practice | | Sales value (USD) |
|-------------|-----------------------|------------------|----------------------|------------------|------------------|-------------------|
| | MT/ha | % of total yield | | MT/ha | % of total yield | |
| Colossal | 8,1 | 18 | 5.346 | 6,7 | 16 | 3.478 |
| Big | 21,6 | 48 | | 12,6 | 30 | |
| Medium | 9,9 | 22 | 990 | 12,2 | 29 | 1,218 |
| Small | 5,4 | 12 | 270 | 10,5 | 25 | 525 |
| Total yield | 45 | - | 6.606 | 42 | - | 5.221 |
| % increase | 7% | - | 27% | - | - | - |

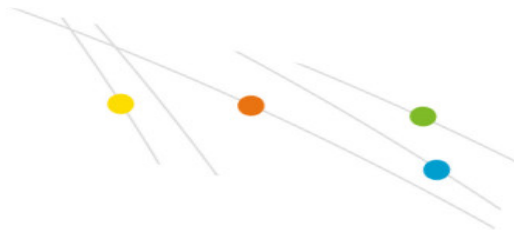


Image 1. The trial was realised by Alinne Palacios, Agronomist of SQM Mexico Zone Center.



Image 2. Harvest time.

For the fresh onion market, a homogeneous distribution of onion sizes is required. Four size classes are distinguished in Mexico, and the market for large to colossal sizes is best.

There is a trade-off in aiming for large onions: The two larger classes - large and colossal - obtain the highest value in the market, however, these two classes also cause the highest post-harvest weight loss. This is mainly the result of lack of



balanced nutrition during the development of the crop.

The aim of the trial was to demonstrate that adequate nutrients during all stages of the crop-cycle will lead to more uniform sized bulbs with more than 50% of the onions in medium to large classes, with an extended shelf life after harvest.

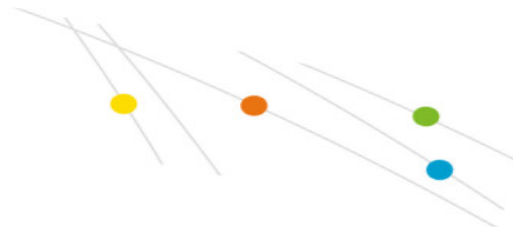
Note that the programme was designed to show the grower the benefit of using balanced nutrition in his own fields, with restrictions in costs and the amounts of nutrients. These restrictions were imposed not to deviate too strongly from the current practice and relatively low expected yield. The total amount of applied nutrients, and the amounts of calcium, potassium and meso- and micronutrients need to be further optimised to reach the potential yield in this area of 55 MT/ha of onions.

Results Highlights

The yield and profit increased considerably with application of SQM's programme compared to the farmer's practice (Tables 2 and 3):

- 7% higher total yield.
- The proportion of large and colossal size class increased from 46% to 66%.
- 50% lower post-harvest weight loss after 21 days of storage.
- 3x higher profit with only 5% higher production costs.

Additionally the farmers appreciated the ease of application. With a maximum of 2 different bags per fertilizer tank preparation, this complete plant nutrition provided with Ultrasol[®] Cebolla programme was just as easy to apply by the farmer as the



traditional fertilizer.

The storage test yielded further impressive indication of the high quality of the onions treated with the SQM programme: these lost only 10% of the initial weight on storage after 21 days, whereas the farmers onions lost twice as much: 21%.

Table 3. Farmers profit.

| Cost / Benefit | SQM Ultrasol® Cebolla | Farmers practice | Difference SQM Farmer | |
|--------------------------|--------------------------|------------------|-----------------------|------------|
| | USD/ha | USD/ha | USD/ha | % increase |
| Cost fertiliser | 668 | 436 | 232 | 53% |
| Cost cultivation, labour | 4.225 | 4.225 | - | - |
| Total costs | 4.893 | 4.661 | 232 | 5% |
| Yield value | 6.606 | 5.221 | 1.385 | 27% |
| Profit | 1.713 | 560 | 1.153 | 206% |

What is next?

- There is room for further improvement of the programme, to reach the potential of the crop in the Morelos area of 55 ton / ha.
- Similar, there is room to further increase the proportion of large-colossal bulbs, to the average 60% as can be achieved with this cultivar.
- The strongly decreased shelf-life of the onions in farmer's practice can be explained by the very low potassium and calcium supply. To further increase yield, size and shelf life of the bulbs, it is recommended to further increase the application of both elements in the programme.