

More and larger onions result in double farmers net income with Qrop® complex Top K fertiliser programme in Iraq



Figure 1. Three fertiliser programmes applied in the Qrop® complex Top K demonstration trial on onion in Iraq.

**Including Qrop® complex Top K at 100 kg/ha in the normal farmers onion fertiliser practice in Iraq, increased total bulb yield in kg/ha by 84%, and the farmers net income by 110%.**

The Qrop® based programme was still superior (+31% higher yield and + 43% higher net income) when compared to a double rate of the standardly used fertilisers. With Qrop® complex Top K, the quality of the yield was improved: the percentage of onions in the highly valued grade A size class increased by 30% compared to the farmers practice.

The higher quality of onions results from well-balanced nutrient supply with Qrop®



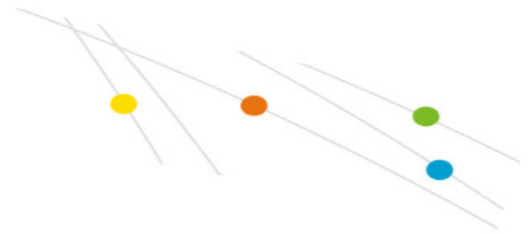
complex Top K, providing extra potassium and meso- and micronutrients like sulphur, magnesium, calcium and zinc; nutrients which are lacking in the farmers practice. This had a beneficial effect on early crop growth with a distinct advantage in plant height: +10-30 cm higher plants with Qrop® compared to farmers practice.



*Figure 2. Taller plants with Qrop® complex Top K, 9th of April 2018. Treatments f.l.t.r.: 1. Qrop® complex Top K; 2. Double N, P; 3. Farmers practice.*

Onion is the fourth most consumed vegetable in Iraq after tomato, potato and cucumber, and is an excellent opportunity for crop diversification for Iraqi farmers.

This had a beneficial effect on early crop growth with a distinct advantage in plant height: +10-30 cm higher plants with Qrop® compared to farmers practice. Size class



A onions are valued 40-80% higher compared to lower size class B and C.

The demonstration trial was established in large farmers field plots (2500 m<sup>2</sup> = 1 Donum) in Erbil, Makhmour District in Iraq (Figure 1). Subject to the treatments were transplanted onions of the variety Yaqut. Trial period: March-end May 2018.

The trial included three treatments (Table 1), each applied on the soil in adjacent stripplots. Details of yield were assessed in triplicate assessments on randomly allocated square meter plots in this area. Plant height was assessed twice, 1 and 2 months after the start of the trial, on 10 random plants in the plot. Yield (fresh weight directly after harvest) and percentage quality (size) class A, B or C were assessed in triplicate subsamples from square meter plots. The trial was performed by the Debbane Agri technical and trials department: Dr Hussein Abbasi PhD (Technical manager Debbane Iraq), Eng Rani Bassil (Central product manager), Eng Baderkhan Mohammed (Technical advisor), Eng Gilbert Medawar (Regional technical Manager).



Figure 3. Bigger sized bulbs with Qrop® complex Top K at harvest. Treatments f.l.t.r.: 1. Qrop® complex Top K; 2. Double N, P; 3. Farmers practice.



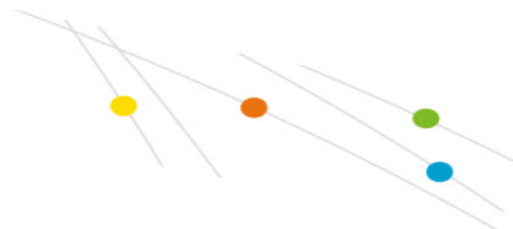


Size class A onions are valued 40-80% higher compared to lower size class B and C. The SQM agronomist team in Ecuador selected a group of progressive producers to cooperate in the development of the use of crop-stage specific Qrop® mix formulas. One of these was Ing. Jorge Estrada.

Investigations with these producers led to the conclusion that not the amount of potassium supplied to the crop but the source of potassium applied was the limiting factor, resulting in low yields. The SQM team proposed to replace the major part (80%) of  $K_2O$  supplied with potassium chloride (MOP) by potassium nitrate from Qrop® mix, and slightly increasing the total K dose from 105 to 115 kg  $K_2O$ . The total application N and P remained the same - with Qrop® mix replacing 66% of N traditionally applied with urea and ammonium sulphate - and reducing the amount of Azufertil (a relatively expensive source of Mg, Zn and Ca and S) by 50% (Table 1).

Both fertilizer programmes were compared on a large field of 24,6 ha. The control treatment with the client's current programme covered 22,4 ha and the SQM programme covered 2,6 ha. The SQM programme included two stage-specific Qrop® mix formula's: Qrop® mix Desarrollo (28-0-12) and Qrop® mix Producción (17-0-35).

*Table 1. Three fertiliser programmes applied in the Qrop® complex Top K demonstration trial on onion in Iraq.*



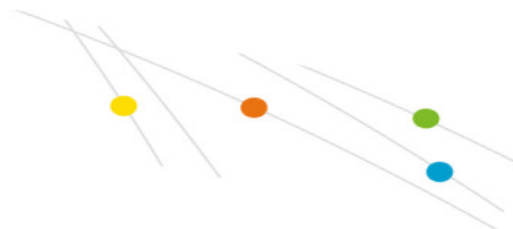
| Application method<br>Metodo de aplicación  | Application timing<br>Fecha de aplicación   | Fertiliser source<br>Fuente de fertilizante<br>(N-P <sub>2</sub> O <sub>5</sub> -K <sub>2</sub> O) | 1. Qrop® complex Top K<br>kg/ha | 2. Double N, P<br>Doble N, P<br>kg/ha | 3. Farmers practice<br>Práctica habitual del agricultor<br>kg/ha |                   |                   |                   |                               |                               |                               |                  |                  |                  |    |
|---|---|--|---------------------------------|---------------------------------------|--|-------------------|-------------------|-------------------|-------------------------------|-------------------------------|-------------------------------|------------------|------------------|------------------|----|
| Soil application<br>Aplicación al suelo   | Top dressing, pre-planting, single application<br>Aplicación superficial, pre-siembra, aplicación única | Qrop® complex Top K (12-6-24)  | 100                             | 0                                     | 0  |                   |                   |                   |                               |                               |                               |                  |                  |                  |    |
|   |   | DAP (18-44-0)  | 100                             | 200                                   | 100  |                   |                   |                   |                               |                               |                               |                  |                  |                  |    |
|   |   | Urea (46-0-0)  | 200                             | 200                                   | 100  |                   |                   |                   |                               |                               |                               |                  |                  |                  |    |
| Total fertilisers / Total de fertilizante (kg/ha)   |   |  | 400                             | 400                                   | 200  |                   |                   |                   |                               |                               |                               |                  |                  |                  |    |
| Total macro nutrients / Total de macro nutrientes (kg/ha)                                     |   |  | N NO <sub>3</sub>               | N NO <sub>3</sub>                     | N NO <sub>3</sub>  | N NO <sub>3</sub> | N NO <sub>3</sub> | N NO <sub>3</sub> | P <sub>2</sub> O <sub>5</sub> | P <sub>2</sub> O <sub>5</sub> | P <sub>2</sub> O <sub>5</sub> | K <sub>2</sub> O | K <sub>2</sub> O | K <sub>2</sub> O |    |
|   |   |  | 9                               | 21                                    | 92   | 50                | 24                | 0                 | 36                            | 92                            | 88                            | 0                | 0                | 18               | 46 |
| Total meso/micro nutrients (kg/ha or *g/ha)<br>Total de meso/micro nutrientes (kg/ha o *g/ha) |   |  | MgO                             | SO <sub>3</sub>                       | CaO  | Zn                | Mn                | B                 | -                             |                               |                               | -                |                  |                  |    |
|   |   |  | 2                               | 10                                    | 3  | 50*               | 40*               | 10*               |                               |                               |                               |                  |                  |                  |    |

Table 2. Plant height (cm) in response to the different fertiliser programmes (average ± standard deviation, n=10 plants).

| Date / Fecha | 1. Qrop® complex Top K<br>(cm ± sd) | 2. Double N, P / Doble N, P<br>(cm ± sd) | 3. Farmers practice<br>Práctica habitual del agricultor<br>(cm ± sd) |
|--------------|-------------------------------------|--|--|
| 28/03        | 65 ± 6                              | 56 ± 5                                   | 49 ± 4   |
| 28/04        | 79 ± 7                              | 72 ± 7                                   | 55 ± 8   |

Qrop® complex Top K had a beneficial effect on early crop growth with a distinct advantage in plant height (+10-30 cm higher for Qrop® compared to farmers practice) (Table 2 and Figure 4). This seems mainly a response to the increase in nitrogen supply, since both treatment 1 (Qrop®) and 2 (Double N,P) resulted in bigger plants as the season progressed.

The improved plant development is reflected in a higher total bulb yield for both treatments 1 and 2 over the farmers practice. With Qrop® complex Top K, the plants were better able to provide the bulbs with carbohydrates from the leaves due to the



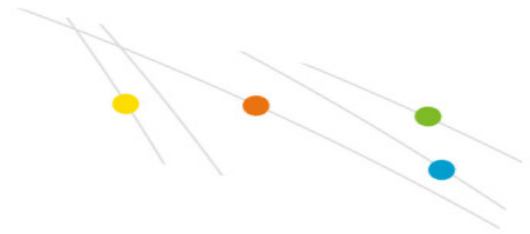
additional K supply, resulting in almost double the total bulb yield (+84%) over the farmers practice with Qrop® complex Top K. Doubling of the standard fertiliser rate resulted in a lower increase in bulb yield (+41%) over farmers practice (Table 3 and Figure 5).

Table 3. Onion yield (Fresh onion bulbs, MT/ha) and distribution over three quality classes (%).

| Quality class<br>Clase de calidad | 1. Qrop® complex Top K |                              | 2. Double N, P / Doble N, P |                              | 3. Farmers practice /<br>Práctica habitual del agricultor |                              |
|-----------------------------------|------------------------|------------------------------|-----------------------------|------------------------------|---|------------------------------|
|                                   | TM/ha                  | % grading /<br>clasificación | TM/ha                       | % grading /<br>clasificación | TM/ha   | % grading /<br>clasificación |
| A                                 | 41                     | 50                           | 19                          | 30                           | 9   | 20                           |
| B                                 | 28                     | 35                           | 28                          | 45                           | 24  | 55                           |
| C                                 | 12                     | 15                           | 15                          | 25                           | 11  | 25                           |
| Total                             | 81                     |                              | 62                          |                              | 44  |                              |

Improvement of the quality of the onions was an additional benefit of introduction of Qrop® complex Top K above the increase of N supply. The percentage of onions in the highly valued grade A size class increased by 30% compared to the farmers practice. Increasing only the amount of N and P by doubling DAP as well as urea, increased the percentage grade A yield only by a moderate 10% (Table 3 and Figure 5).

Grade A onions are valued 1,5-1,8 times higher than the lower B and C classes. The combination of 84% higher yield and higher proportion of A quality bulbs, returned – with interest – the higher investment in Qrop® complex Top K (Table 4). Introduction of Qrop® complex Top K in fertilisation of onions in Iraq, increased the farmers net income by 110%, compared to normal farmers practice without potassium with only DAP and Urea at 100 kg/ha each.



The farmers net income is increased to a much lower extent - 47% - when an equal amount of N is applied by doubling the applied amounts of DAP and Urea. This is mainly attributed to the increased yield of the highly valued grade A bulbs in the programme with Qrop® complex Top K.

Table 4. Financial results for the farmer. Prices: Class A: 450 ID/kg (0,38 USD/kg), Class B: 320 ID/kg (0,27 USD/kg) and Class C: 250 ID/kg (0,21 USD/kg). \* Net income calculation only includes fertilisation cost.

|  | 1. Qrop® complex Top K | 2. Double N, P / Doble N, P | 3. Farmers practice / Práctica habitual del agricultor |
|--|------------------------|-----------------------------|--|
| Total income / Ingreso total (USD/ha)                | 25785                  | 18094                       | 12286  |
| Cost of fertiliser / Costo del fertilizante (USD/ha) | 213                    | 167                         | 116  |
| Net income / Ingresos netos (USD/ha)                 | 25572                  | 17927                       | 12170  |