

Gourmet potatoes grown with hydroponics

The demand for small, gourmet, fresh market potatoes has increased in recent years. An experiment conducted at Krugersdorp South Africa, production of small gourmet potatoes using hydroponics culture demonstrated 24% increase in yield per square meter in comparison to conventional soil

Considering tuber size/weight of marketable gourmet potatoes (50 – 60g); tubers grown in the hydroponics culture demonstrated a significant higher percentage in volume and weight in comparison to tubers grown in soil (8.2 tubers per plant versus 1.6 tubers in soil). The results suggest that tubers of a high yield variety (Ronaldo), can improve production significantly per square meter of marketable tuber numbers by using hydroponics culture.

The trial: Cycle duration: 18 September – 5 December (77 days). The experiment intends to evaluate and analyse the development and yield of Gourmet Potato varieties in hydroponics culture.

Experiment design: The experiment was conducted in a 30m by 10m conventional tunnel (150 micron, PE plastic cover).

Three replicas were used for the purpose of evaluation:

- 1 Tubers grown in PP (Polypropylene) bags*
- 2 Tubers grown in trough (Depth 25cm)
- 3 Tubers grown in soil. (Sandy loam)

Tubers grown in PP bags and troughs were supplemented with an identical nutrient program, while tubers in PP bags were also supplemented with Silicon (SiO₂)**

Varieties and set-up: Three “Gourmet” varieties were chosen for this experiment: Ronaldo- red skin potato; Sifra- round shape pale brown skin potato; Mondial- Elongated tuber, brown/pale potato.

Each variety tubers were planted in 17 PP bags each on separate line and each variety was represented in the trough system by 15 plants of each. Each variety was represented in the trough system by 15 plants of each.

Each variety was planted in rows in soil represented by 14 plants. Tubers (seeds) were selected to size to enable fair results (40 – 60g)***

Growing Medium: Tubers/plants in the hydroponics culture were planted and developed in medium grade Perlite. (Terrapearl- produced by Lake International Technologies – Infigro Natural Technologies division.

Irrigation Method: Plants were irrigated by drip irrigation.



Seedlings in PP bags October 1st



Plants in PP bags October 12th (Ronaldo – left, Sifa – right)

DENSITY: Plants/tubers developed in PP bags in a density of 9 plants per bag of 100L Perlite, allowing about 11L volume per plant at root zone with plant density of 18 plants / square meter. Plants in soil replica were planted in rows, 40cm between rows and 40cm apart in the row. Replica in troughs enjoys more root zone space ± 20L per plant, with same density (18 plants/square meter).

NUTRIENT PROGRAM: Tubers planted on September 18th. For the first 3 days the bags were irrigated with borehole water (pH 6.0, EC 0.34 mS). From day 4th the EC was raised to 1.0 mS and pH kept at 6.0 – 6.2 until week 5 (36 days). From the 36th day onwards EC was raised to 1.4 mS with pH kept at 6.2.

The first growing period (vegetative stage 4th – 36th days) tubers/plants were irrigated with nutrients based on; Hydroponics mix (Shiman (Pty) Ltd at 1kg per 1000L. The hydroponic mix contained all macro nutrients and micro-nutrients (annex 1). Calcium supplement was applied using Calcium Nitrate at a rate of 680g per 1000L of water and Potassium Sulphate at a rate of 300g per 1000L of water. Plants grown in PP bags were supplemented during the all cycle duration with Silicon (SiO₂) (supplied by Agrisilis – www.agrisilis.com), at a rate of 60g per 1000L of water (Nutrient program A). Plants grown in troughs were not supplemented with Si (nutrient program B).

All tubers showed growth within the first 10 days from planting (18 – 28 September). Nutrient program was changed at day 35 to improve and transform vegetative stage into production by applying: Potassium Chloride (KCl) at a rate of 500g per 1000L of water and 40g of Magnesium Sulphate per 1000L of water. Potassium sulphate was not applied from day 36th onwards. Nutrients and irrigation was stopped on October 15th (day 57) and tubers were left to mature and dry out.

Vegetative Stage: Plants developed at a rapid rate from November 4 – 5th onward. Vegetative growth was prolific and plants reached heights of 70 – 90cm in the hydroponics culture. Plants in the soil developed at a slower rate with stems which were significantly shorter and less dense.

Production Stage: Plants in the hydroponics culture show first flower buds from day 48 but significantly mostly on “Ronaldo” variety, “Sifra” and “Mondial” set flowers 14 days later. Soil plants replica initiate flowering 5 – 6 days later. Stolons formation from day 50 has shown good numbers of stolons and tubers forming especially on “Ronaldo” variety.

Results: From analysing the new tubers formed it is clear that Potatoes grown in a hydroponics culture and specifically in PP bags produce the highest quantity and highest percentage of marketable size tubers.

From the varieties production analysis the Ronaldo variety produced higher number of tubers per plant and overall in comparison to “Sifra” and “Mondial” varieties. Plants developed in hydroponics culture in the PP bags and in troughs produced a higher quantity of marketable tubers



Plants, November 6th (Flowers formation)