



Protocols for the best cultivation practices for pumpkin production

DELIVERABLE 1.4

### PulpIng

Developing of **Pumpkin Pulp** Formulation using a Sustainable **I**ntegrated Strategy





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## Document Information

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## 1. Scope of the document

The scope of this report is to define the best agronomic conditions for each participating party involved in pumpkin cultivation (e.g. Greece, Tunis and Egypt).

## 2. Best practice guides for Greece

Seeds should be sown in rows at distances of 1.6 m within each row and 2.0 m between the rows. Before sowing a complex fertilizer (18-9-18, N-P-K; Complex Haifa Turbo K + Mg +S + Fe and Zn; Haifa Group, Israel) has to be applied as base dressing at a rate of 250 kg/ha and to be evenly distributed with a rototiller. Irrigation should be applied via a drip irrigation system (one emitter per plant with water supply of 6 L/h) at regular intervals based on the environmental conditions during the experimental period. Irrigation should be scheduled based on the recordings of soil moisture content taken at regular intervals aiming to retain 100% of field capacity. Soil moisture measurements should be taken at soil depths of 10, 20, 30 and 40 cm using the proper equipment.

After crop establishment, fertilization could be applied via the drip irrigation system (fertigation) or via side dressing. In particular, plants have to receive ammonium nitrate (34.5% nitrogen; 80 kg/ha), 0-0-52 (N-P-K; 40 kg/ha) and Disper bloom. Then plants can be foliary sprayed with Disper bloom (100 g/100 L of water) and Root & leaf (20-20-20, N-P-K +TE; 200 g/100 L of water). Plant fertigation with 80 kg of ammonium nitrate and 40 kg of Solusop and with 50 kg of ammonium nitrate, 50 kg/ha of 0-0-52 and 15 kg/ha of Mannitol 3 GR. Weeds can be controlled chemically with pre-emergence herbicides, as well as manually with a hand hoe during the growing period and until crop establishment. Pests and pathogens can be chemically controlled based on the recommended practices of the crop.

## 3. Best practice guides for Egypt

In Egypt, pumpkins are generally propagated with direct sowing of seeds in the field during the second week of May. Fertilizer recommendations are based on soil test results, and soil tests should be taken every year. In absence of soil test results, recommended N-P-K application rates are 80-150-150 broadcast or 40-75-75 banded at planting. Soil calcium levels should be checked; if tests show low or low to medium content of calcium and have not received any calcitic (calcium-based) lime applications, we should apply gypsum to the field in bands at the rows where plans will be grown prior to sowing. Gypsum will supply calcium to the soil without changing soil pH.

Pollination with honey bees is important for proper, complete pollination and fruit set. One hive per acre is the recommended population of honey bees for maximum fruit production. Populations of pollinating insects may be adversely affected by insecticides applied to flowers or weeds in bloom.

Control of weeds can be achieved with a good crop rotation system and herbicides. Pumpkins can be competitive against weeds once they develop their full canopy, if they are planted at high plant populations, or if they are planted with plastic mulch. There are several pretransplant and postemergence herbicides labeled for pumpkins, depending on specific weed problems requiring control and on the growth

stage of pumpkin plants. In addition, under mild infestation levels, early cultivation (if possible prior to vine running) can minimize weed problems.

Insects can be a major problem in pumpkin production. Cucumber beetles, aphids, squash vine borer, seed corn maggot, squash bug, and spider mites have the potential to cause a reduction or loss of the marketable yield in any given year. Monitoring insect populations through scouting will help growers determine when they should start and stop spraying pumpkins and the intervals between applications.

Several diseases of pumpkin can cause a reduction in crop yield, especially bacterial wilt, viruses (powdery mildew, downy mildew), and scab. Optimum crop yields and fruit color may only be possible if a scheduled fungicide program is used to prevent leaf loss from mildews. Crop rotation, good soil and air drainage, and use of resistant varieties (when possible) can help reduce problems from these diseases in the field.

Pumpkins are hand-harvested at their mature stage, color (orange or white), and size. Because fruit are pollinated at different times, multiple harvests are quite common in field cultivation. Grading pumpkins for size, maturity, and pest damage before marketing is necessary to ensure a high-quality end product. Maintaining pumpkin fruit in a dry, cool environment (a barn, for example) will help extend the shelf life of the fruit retain the visual quality of pumpkins.

Placing pumpkins in a well-ventilated storage area, preferably protected from rain, maintains healthy fruit for processing (pumpkin pie mix) or late sales of Jack-O-Lantern types. Pumpkins will retain good quality for approximately 2-3 months if stored at the appropriate relative humidity (50-70%) and temperature (10-12.8 °C).

#### **4. Best practice guides for Tunis**

##### **Trial 1: Conventional farming**

Plants should be planted in ditches 50 cm deep and 50 cm wide spaced 2 m apart. The soil should be covered with plastic film for weed management. The plants were planted at 1.6 m apart. Before planting, manure should be incorporated into the soil to increase organic matter. Irrigation should be applied via a drip irrigation system (one emitter per plant with water supply of 4 L/h) at regular intervals based on the environmental conditions during the growing period. After crop establishment, once a week, fertigation should be applied as follows (i) low fertilization rate (standard fertilization rate – 10%), (ii) standard fertilization rate (144 kg of N per ha, 75 kg of P<sub>2</sub>O<sub>5</sub> per ha, 321 kg of K<sub>2</sub>O per ha and 60 kg of MgO per ha), (iii) average fertilization rate (standard fertilization rate + 10%) and (iiii) high fertilization rate (standard fertilization rate + 20%).

## Trial 2: Organic farming

Plants should be planted in ditches 50 cm deep and 50 cm wide spaced 2 m apart. The ditches should be prepared by mixing soil and an organic amendment from solid compost. Irrigation should be applied via a drip irrigation system (one emitter per plant with water supply of 4 L/h) at regular intervals based on the environmental conditions during the growing period. After crop establishment, once a week, fertigation should be applied using compost tea at amounts of 30 to 40 t/ha.