

# Towards the best mineral N fertilization for southern italian peeled tomato quality

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## ABSTRACT

Farmers frequently apply too much Nitrogen (N) fertiliser to tomato crops in order to increase their commercial productivity and profitability. N fertilizers, however, have a significant impact on all aspects of tomato quality, including technical qualities, dietary characteristics, and mineral fruit composition. The purpose of this research was to examine how

circumstances in Southern Italy affected processing tomato output and quality when rates of mineral N fertiliser were increased. The cropping cultivar "Messapico," suited for peeled tomatoes, was used for the study in Battipaglia (Southern Italy), and fruit quality was assessed at the stage of ripening. Findings indicated that N fertilisation reduced burnt fruit yields led to an increase in overall fruit yield, average fruit weight, and other fruit characteristics (size, firmness, colour indexes, pH, N, and calcium content).

**Key Words:** Fertiliser; Leucine; Lysine

## INTRODUCTION

The potassium and magnesium concentration in tomato fruits, N fertilisation adversely affected other fruit attributes, including dry matter and soluble solids content, total sugar index, ascorbic acid content, and salt content. Our findings demonstrate that, in the studied region, 200 kg N ha<sup>-1</sup> is the optimum compromise to meet farmers' and processors' demands, increase output, and simultaneously preserve high fruit quality features.

The tomato (*Solanum lycopersicum* L.), with a production of about 187 million tonnes and an area of 5 million hectares, is the most prolific vegetable crop in the world. That is Considering the overall tomato crop and the amount of tomatoes processed, 38.7 million tonnes are mostly utilized for tomato juice, paste, and peeled tomatoes. European Italy is the top producer of processed tomatoes and provides a sixth of the world's supply (6 million tonnes in 2021): worldwide yield. Italy generates between 70 and T HA1 on average. It produces more than 110 T HA1 of processed tomatoes and is the largest exporter of global production of processed tomatoes has increased steadily since 1961, peaking at 61 million tonnes. of canned goods in 2019 (mostly peeled tomatoes, paste, and juice). Southern Italy represents the most important region in the Italian setting of productivity and Campania supplied a nearly entirely cultivated surface. 4000 hectares, 246,000 tonnes of output overall in 2019. 92.5%–95.0% of the tomato's weight is made up of water, while the rest is made up of dry matter. The latter

contains sugars (48%: 25% fructose and 20% glucose). Organic acids (13%: 9% citric acid, 4% oleic acid), structural materials (17%), and sugar (1%), malic acid, protein, lipids, and dicarboxylic amino acids (12%), minerals (8%) and miscellaneous components make up the remaining 8%.

Chemicals, according to Davies and Hobson (2%), the tomato is one of the foods with the highest concentrations of Potassium (K), Phosphorus (P), Selenium (Se), Magnesium (Mg), and One serving of fresh tomatoes (200 g) typically contains 517 mg of potassium (15% of the Adequate Intake–(AI)—for adults), 48.5 mg of phosphorus (8.8% of the AI for adults), 24.4 mg of calcium (2.5% of the population Reference Intake–(PRI)—for adults), and 21.5 mg of magnesium (4% of the AI for adults). Ascorbic acid (AsA, 40.7 mg per serving [10], 37% of PRI for adults), carotenoids almost entirely represented by lycopene: 1.4 mg-40 mg per serving, and polyphenols.

Among which naringenin chalcone stands out: 1.8 mg-36.4 mg per serving have all been acknowledged as important sources of antioxidant compounds. These include tomatoes and their industrial products. Vitamin C and lycopene have been widely researched as two crucial. Collins studied the antioxidant components in tomatoes in great detail, concluding that they offer protection against a variety of illnesses, including cancer and heart disease. Additionally, it was shown that vitamin C is crucial for increasing the availability of Iron (Fe) for dietary absorption in humans. It is noteworthy how various

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agronomic techniques (such as fertilisation, irrigation, etc.) affect the buildup of these beneficial substances in tomato fruits.

Since tomatoes are a produce that require a lot of Nitrogen (N), N fertilisers are frequently used in excess to ensure high crop profitability with little consideration for environmental problems brought on by over-fertilization. Furthermore, N offers a lot that impact the overall quality of the tomato, according to a thorough literature review. Rate, duration, application methods, and types of N fertilisers are important variables that can have an influence. About the dry matter and soluble qualities of tomato fruit that make it suitable for processing color, pH, titratable acidity, solids. These factors might improve the quality and longevity of the finished product (for example, a lower pH harms the growth of an increased risk of bacteria spoiling tomato products or a greater sugar content greater flavour) and/or enhance certain industrial procedures (for example, increase fruit dry matter increases paste concentration quickly). In tomato fruits, Ni fertilisation also increases n-derived organic compounds.

Nitrites and nitrates are two compounds that pose a major risk to human health. In fact, nitrate and nitrite were labelled as potentially toxic substances by the Joint FAO/WHO Expert Committee on Food Additives (JECFA) and Scientific Committee on Food (SCF), and an Acceptable Daily Intake (ADI) of  $0 \text{ mg kg}^{-1}$ - $3.7 \text{ mg kg}^{-1}$  bodyweight for Nitrates ( $\text{NO}_3$ ) and an ADI of  $0 \text{ mg kg}^{-1}$ - $0.07 \text{ mg kg}^{-1}$  bodyweight for Nitrites ( $\text{NO}_2$ ) was established. It seems necessary to optimize the rate of N provided to the crop, improving yield and quality-related parameters simultaneously. This is because N is important for production and quality improvement in a context of variable factors (climate, soil, cultivar, time and method of N application, form of N fertiliser, etc.). Marketable yield, technical characteristics, nutritional quality and quality indices, and mineral composition are the next four categories. The ultimate objective was to determine the ideal N rate on a traditionally managed processed tomato in a key location of production in Southern Italy (Campania region) that represented the best balance between high marketable yield and excellent fruit quality. Given its extensive usage in Southern Italy and its resistance to the Tomato Spotted Wilt Orthospovirus (TSWV), which can have disastrous effects in Mediterranean climates, the peeled tomato cultivar "Messapico" was chosen for this study.