Maltese olives and their genes

Oriana Mazzitelli

THE OLIVE TREE (*Olea europaea* L.) is one of the oldest species of domesticated trees and the second most important oil fruit crop cultivated worldwide. 97% of the global olive cultivation is concentrated in the Mediterranean Basin. The olive thrives in Maltese soils. Economically, olives are not important for local agriculture, but its cultivation is becoming popular since the Maltese agribusiness has a lot of room for growth to make high quality oil and secondary products.

In the Mediterranean region there are two subspecies of Olive tree. These are the wild olive (*O. europaea* L. subsp. *Oleaster)* and the cultivated olive (*O. europaea* L. subsp. *Sativa)*. Each subspecies has several cultivars selected for taste, size, disease resistance or other desirable qualities. There are 1,300 cultivars worldwide and Malta is no exception. The *Maltija* cultivar is probably the most popular Maltese cultivar and can give a high productivity. The *Bidnija* cultivar, which is believed to be the oldest Maltese olive cultivar (it is thought to date back to Roman times), produces oil of excellent quality rich in polyphenols (these have many health benefits), exhibits high tolerance to environmental stress such as salinity and drought, and demonstrates resistance to pathogens and pests such as the olive fruit fly. The *Bajda* variety produces a characteristic white drupe. Besides the native cultivars, there are a number of Maltese wild olives.

Renowned foreign varieties associated with high productivity tend to have a higher productivity than local cultivars. For this reason, local farmers find foreign varieties more convenient, leaving Malta at risk of forever losing its unique olives.

Till now revival efforts focus on artificial propagation and re-plantation. These trees are identified by their appearance. This is an inaccurate method since olive growth is influenced by environmental conditions.

To develop a better way to identify local cultivars, Oriana Mazzitelli (supervised by Dr Marion Zammit Mangion) has focused on adopting a genetic approach. She also wanted to examine the genetic diversity of Maltese olive varieties. Mazzitelli compared the genetic patterns of local varieties to those generated by two commercial Italian (*Carolea*) and Tunisian varieties (*Chemlali*). The genetic analysis produced unique DNA profiles that can provide a more accurate means of identification than just looking at the plant.

The genetic variability between varieties was high. The *Bidnija* and *Maltija* stood out for their genetic uniqueness. The differences between local varieties suggest that, despite being allegedly native, the origins of the two are not directly linked. A number of DNA marker regions detected in the foreign cultivars

The fruit of Bidnija produces oil rich in polyphenols which have properties against cancer and cardiovascular diseases

and in the Maltese wild olive were undetected in the Maltese cultivars, suggesting that not all DNA markers are present and amplifiable in foreign varieties have been conserved in the Maltese cultivars. Mazzitelli's work is an important first step to show that local varieties can be identified cheaply through DNA analysis. Without genetic identification, maintaining and cultivating local varieties would be near impossible—a case of genes for good olive oil.

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Kurt Abela

Smaller, Faster, and just as pretty

VIDEO STREAMING uses a lot of bandwidth. Internet service providers can either limit bandwidth or provide more. To bypass this problem newer encoders aim to compact video into smaller packages, to keep the same video quality but a smaller size.

The problem is the variety of video devices available that range from mobiles, tablets, and high definition TVs. This diversity results in various different video transmissions being needed. To avoid encoding the same sequence several times and reduce the traffic over a network, video coding called H.264/Scalable Video Coding (SVC) was introduced. This type of video coding allows a single stream to encode for time, space, and quality. This technology saves bandwidth. SVC is expected to become the standard for Internet streaming. The only thing holding it back is the need for a complex encoder.

Kurt Abela (supervised by Dr Ing. Reuben Farrugia) proposed the use of a Graphics Processing Unit (GPU) based encoder to speed up the encoder. The Block Motion Estimation (BME) module within SVC takes up the bulk of the total encoding time in standard H.264/AVC. Abela designed certain modules to be optimised for NVIDIA GPUs. Through an asynchronous programming model, the video encoder could be run simultaneously on the CPU (Computer Processing Unit) and GPU. By using this novel encoder, encoding was sped up at most 436x times, when compared to a reference model, with no loss in quality. The encoder was sped up even more with further improvements to allow real-time HD video encoding.

This system is much cheaper and easier to use than leading alternatives. GPUs are very cheap and already found in most computers. Further developments on GPUs could soon see them replace more expensive encoders in datacentres.

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