

Research update

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**Hort
Innovation**
Strategic levy investment

**PISTACHIO
FUND**

Introduction

- Blank nuts
- Increasing Zn absorption
- Young Kerman
- Pollen vs nut quality

Blank nuts

- Blank nuts:

The shell is present, but there is no kernel.

- Factors affect for causing blank nuts based on literature:

- Inadequate pollination (Brar, 2015).

- Ineffective fertilization (Brar, 2015).

Blank nuts

- Competition among resources.
 - ✓ At early stage, lack of carbohydrate and photosynthate to maintain the growth of all the fruitlets – thinning study (Allan et al. 2016).

- Failure of filling the pericarp; partial fill – nutrient imbalance or environment pressures (Meinke and Sussex 1979).

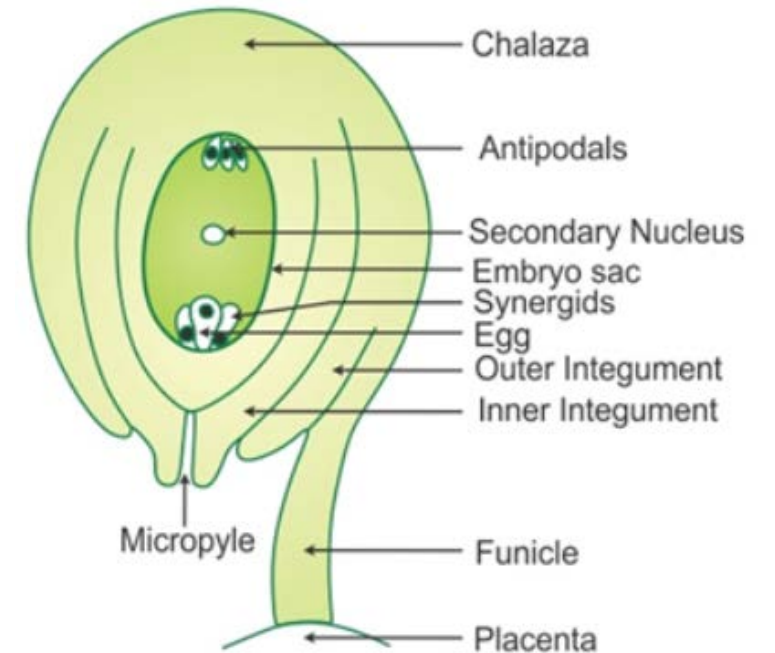
Blank nuts

- Parthenocarpy: Fruit formed without fertilization.



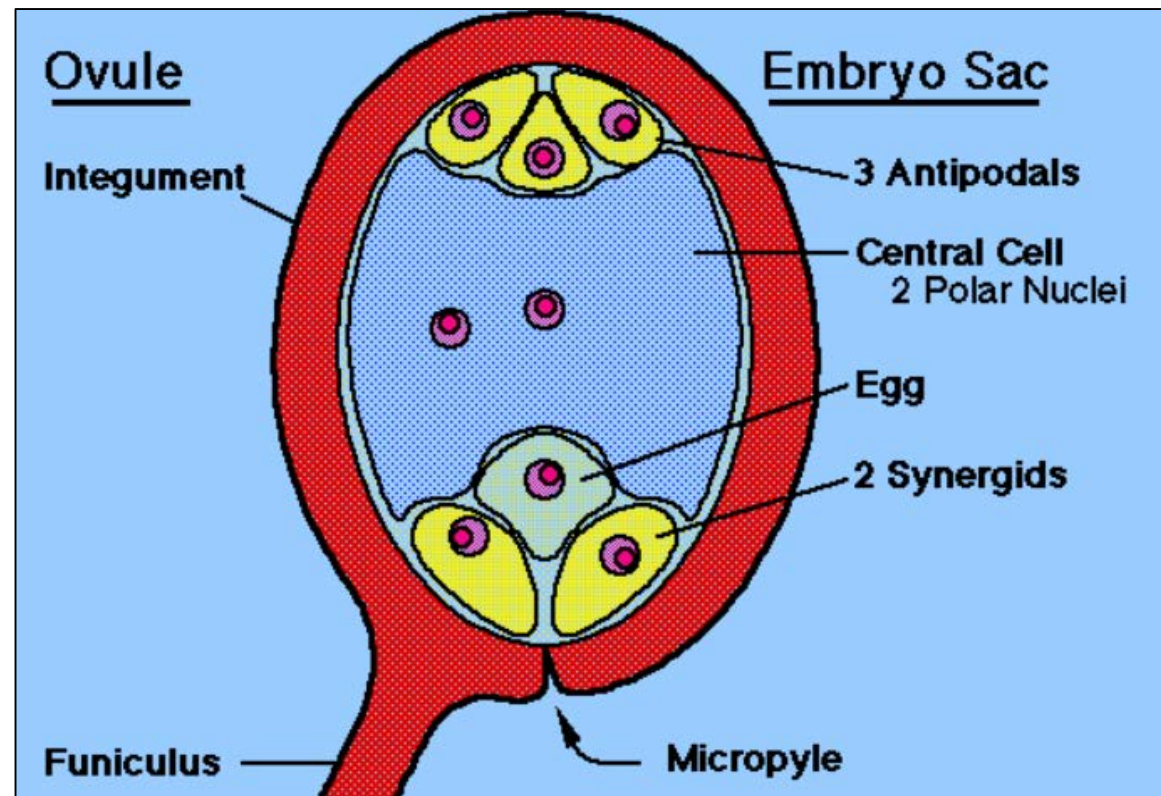
Blank nuts

- Blockage of vascular transport (Polito, 1999).
- Funicle degeneration (Shuraki and Sedgley, 1996).



Blank nuts

- Lack of an embryotic sac in the inflorescence (Allan et al. 2016).

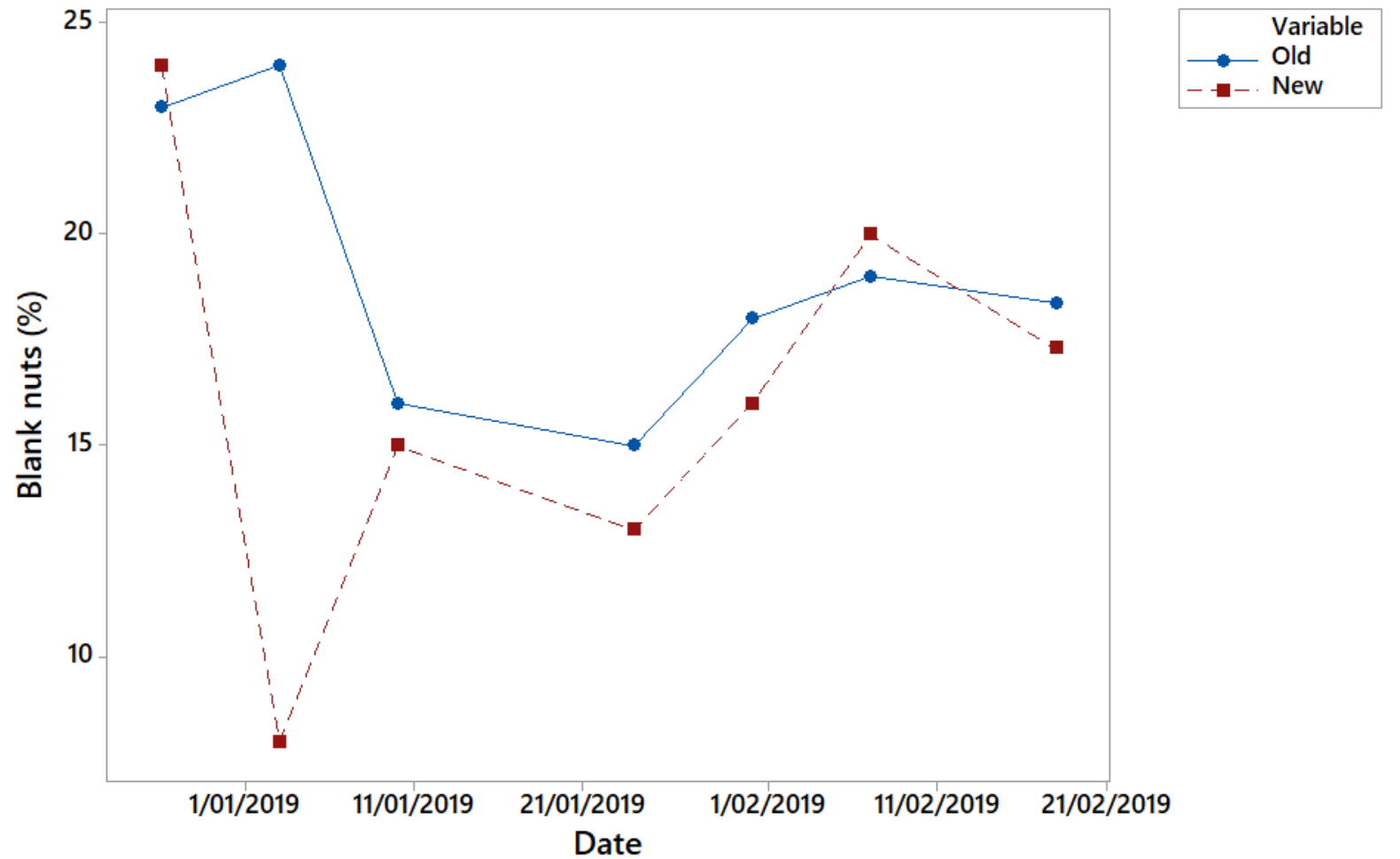


Blank nuts

- Embryo/ kernel abortion due stress conditions (Zhang et al. 2018).

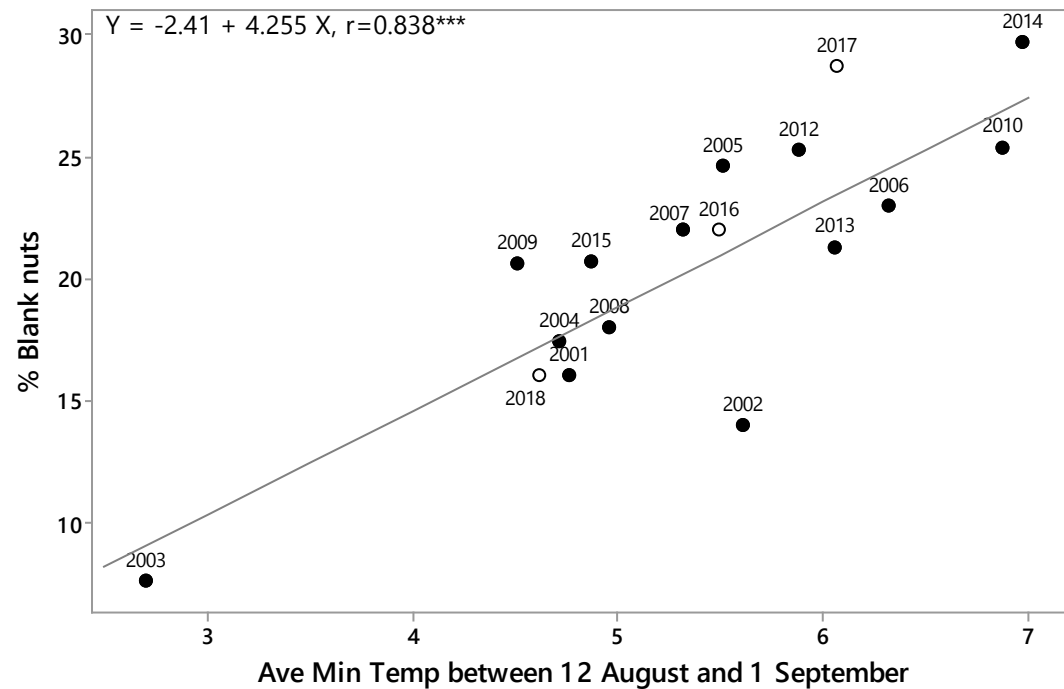


Blank nuts observation



Blank nuts

- Relationship of occurring blank nuts and prevailing average minimum temperature in last few weeks of August (Zhang 2017).



Polymer trial

- Preliminary trial – only 4 trees were sprayed; 2 treatments-5L and 10L.
- Trial was conducted in Martin Simpfendorfer's orchard.
- No phytotoxicity.
- Results were encouraging.
- Polymer trial will be implemented as commercial scale.

Chelation trial

- Nutrient imbalance causes blank nuts.
- Supplement of nutrients as chelation.

Chelation trial

- A preliminary study.
- 20 trees with 5 replicates.
- The phenology will be monitored after application.
- Blank nuts will be monitored from December to harvest.

Increasing Zn absorption

- Zn is essential micro nutrient which produces plant hormones such as Auxin.
- Auxin determines the cell growth and elongation and low level of auxin reduces growth. As a results, dwarf trees and small leaves are produced (Beede et al. 2005).

Increasing Zn absorption

- Foliar application is more effective during leaf out in spring.
- However, thick cuticles in summer acts as a barrier to penetrate through the leaves.
- Lack of Zn in pistachio is shown in early stage of the season.

Increasing Zn absorption

- Zn deficiency:
 - Growth slow down around the growing point of the main stem.
 - The young leaves near the apex become stunted.
 - The basal portion of the young leaves near the apex then develop lighter areas which turn necrotic.
 - The terminal meristem of the main stem dies when the deficiency is severe.

(Loneragan et al. 1979).



Zn deficiency

Increasing Zn absorption

- Methodology:
 - Leaf samples from the treatment area (20 trees) and control area (20 trees) will be collected separately using the standard leaf sampling procedure recommended in California (Robinson and Zhang 2017) at the beginning of the season to determine the Zn content in the leaves.
 - Sirora trees on PG.
 - Control area will be isolated.

Increasing Zn absorption

- Zn will be applied as foliar and soil applications from leaf out - postharvest.
- Just before the harvest, leaf will be analysed to find out the Zn content in leaves.
- Results will be statistically analysed.

Kerman study

- Kerman young plants – production of low yield.
- 3 locations will be considered.
- Will be considered rootstocks, management practises, soil and leaf analysis, etc.
- Long-term study.

Pollen study

- Purpose – To increase the nut quality.
- Literature review.
- Methodology:
 - Identification of available males (Dareton –around 23, commercial orchards - different males).
 - Bagging a female tree.

Pollen study

- Collecting pollen and applying different male pollen to the same female tree.
- Harvesting – hand harvesting nuts separately based on different males.
- Processing will be done separately based on different males.
- Analysing samples based on APPC standards.

Hand pollination work



Bagged female flowers



Male flowers

Hand pollination work



Collection of pollen



Nuts of hand pollinated clusters

Hand pollination work



Other work

- Yield analysis
- Chill prediction

Acknowledgement

- Martin Simpfendorfer, Theo Simpfendorfer and James Simpfendorfer for the support given throughout the polymer trial.

Thank you