

# PGAI Symposium

Mildura

11-09-2019



**Hort  
Innovation**  
Strategic levy investment

**PISTACHIO  
FUND**

# Introduction

- Summary of last 12 months.
- Current research program.
- Update of chill accumulation by end of August 2019.

# Last 12 months.....

- Familiarised with Pistachio crop/tree.
  - Blank nuts monitoring
  - Hand pollination work
  - Visited orchards
  
- Continuation of tasks:
  - Benchmarking yield data.
  - Calculation of chill accumulation.

# Last 12 months.....

- Developed trial proposals and planned to implement. Some trials are being implemented. Discussed research program extensively in R&D committee meetings.
- Involved with the preliminary study on Polymer. Implementing trial at commercial level.
- Presented research updates in PIT group meetings.
- Participated for workshops.

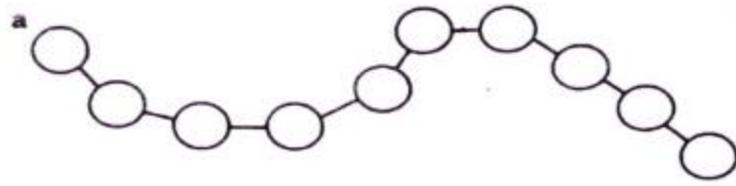
# Current program

- Polymer studies
- Increasing Zn absorption and mobilization in pistachio trees
- Young Kerman study
- Pollen study

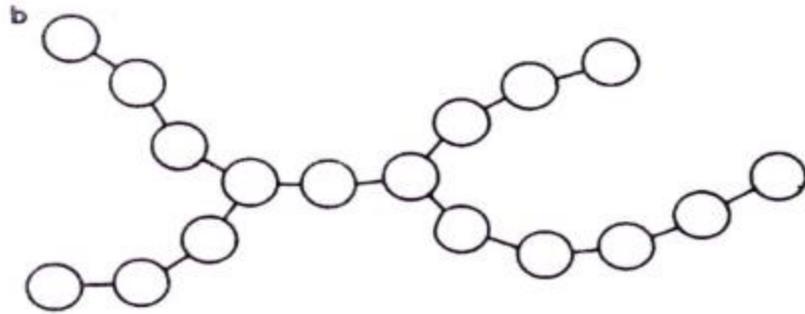
# Polymer application

- Polymer application was common in agriculture and mainly used to maximize land and water productivity without challenging to environment and natural resources.
- Different polymers are available.

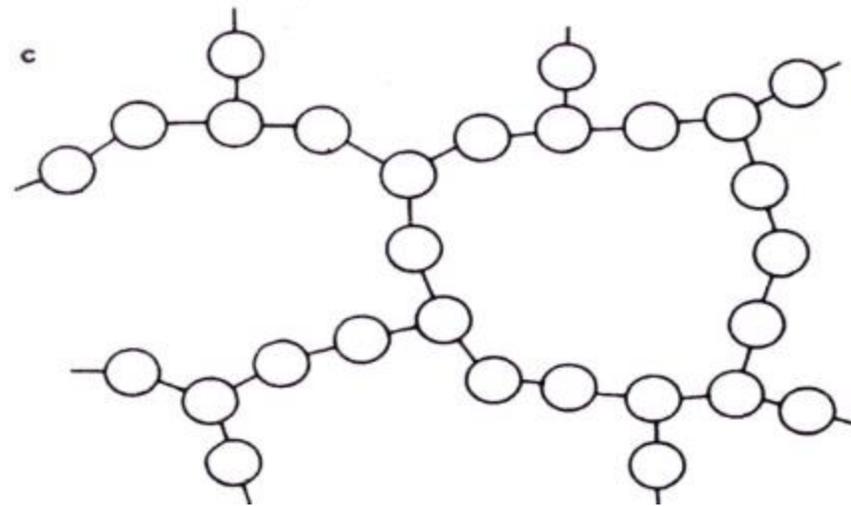
Linear



Branched



Crosslinked  
or Network



# Polymer application

- Create cooler environment.
- Buds will be cooled by evaporative cooling – Removes latent heat from the buds.

# Polymer application – Preliminary study

- **Objectives:**

- To find out phytotoxicity of polymer.
- To assess the responses of polymer on pistachio.

# Polymer application – Preliminary study

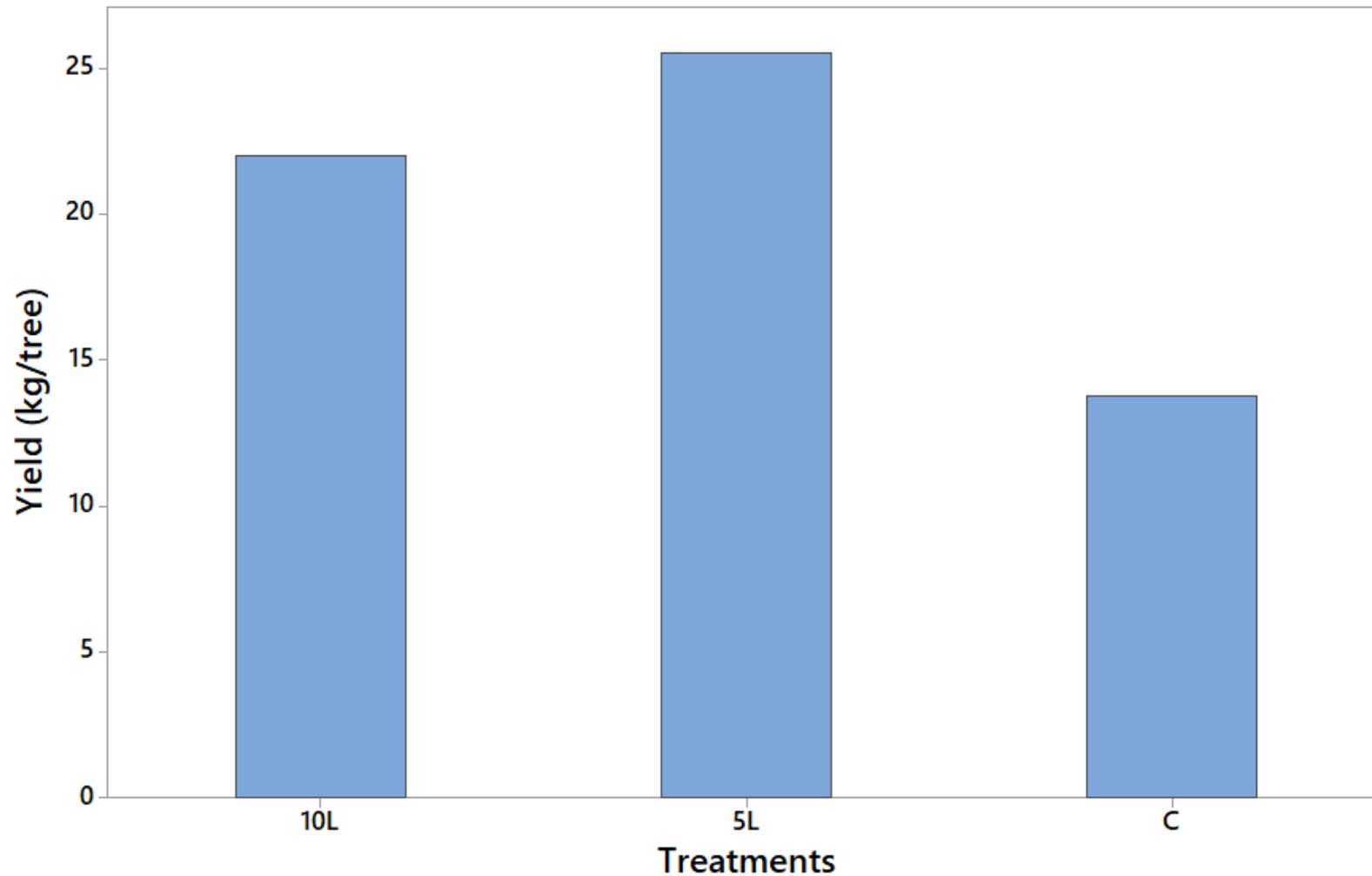
- **Methodology:**

- Started the trial in August, 2018/19
- Application date – 31/08/2018
- Treatments – 5L per 1000L water ( 5 L)  
10L per 1000L water (10 L)
- 5 replicates

# Polymer application

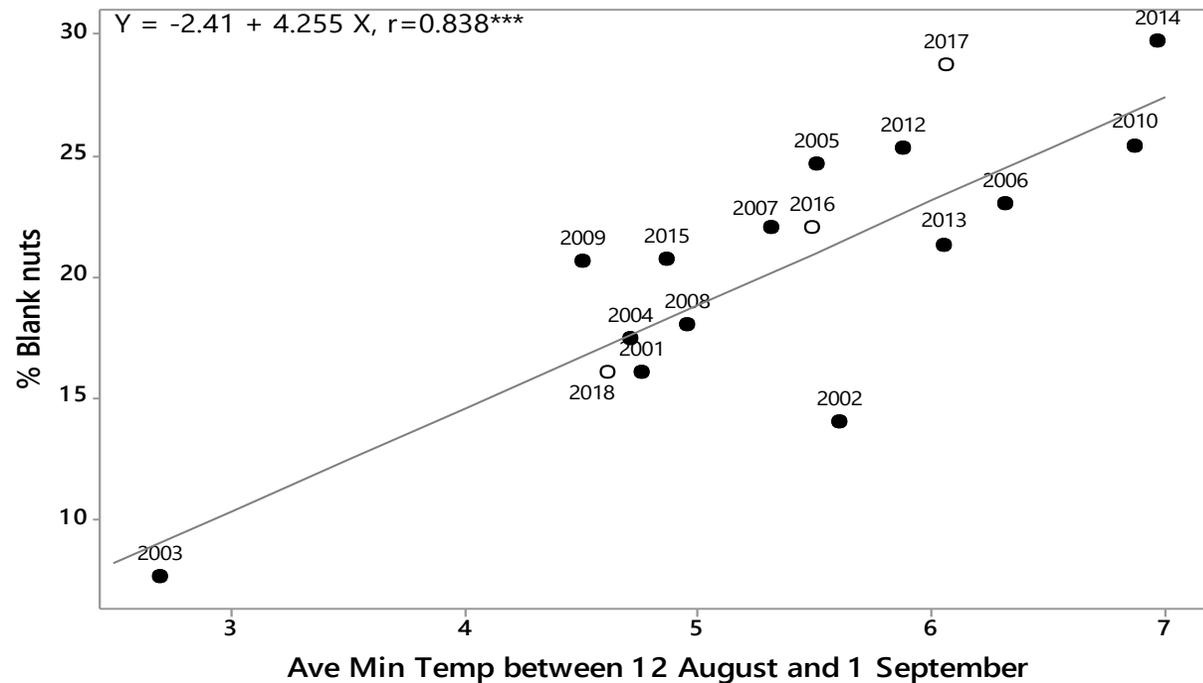
- 7 years old trees.
- Temperature was recorded from four different directions between 7.00am – 11.00am every 3 - 4 days interval from 1<sup>st</sup> week of September – 1<sup>st</sup> week of October.
- 10 L - significantly ( $P < 0.001$ ) reduced temperature by 0.9 – 1.9°C (four directions) than control.
- 5 L - significantly ( $P < 0.001$ ) reduced temperature by 1.1°C (south and west) than control.

# Results of the preliminary study

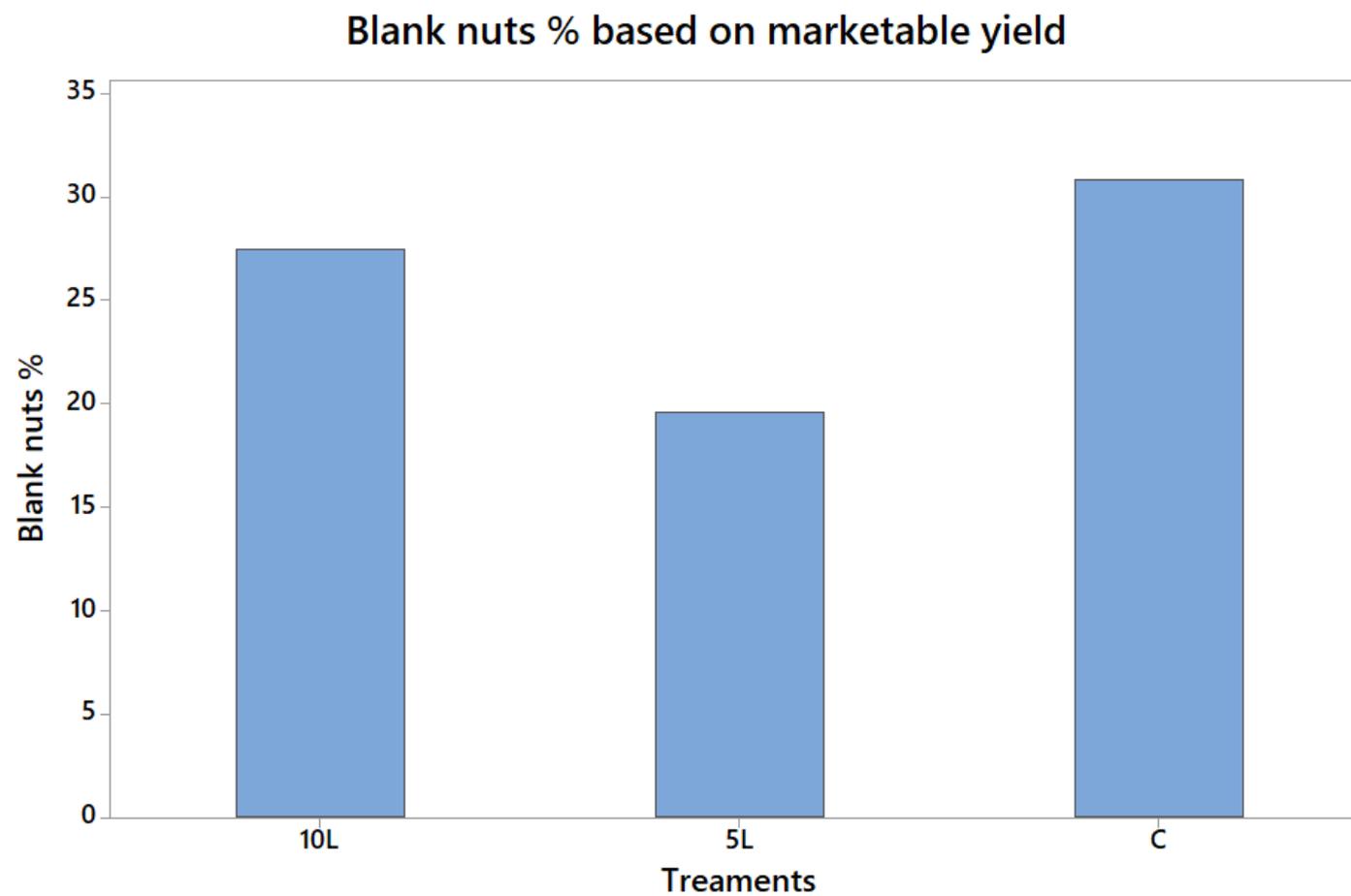


# Blank nuts

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



# Results of polymer preliminary trial



# Polymer studies

- **Hypothesis:**

- Polymer reduces the bud temperature by evaporative cooling.

- **Objectives:**

- To find out

- (1) yield increment.

- (2) reduces blank nuts.

# Polymer studies

- Shoots dipping trial in the polymer solution.
- Replication of preliminary study at commercial level (Polymer application after winter oil).
- Polymer application.

# Shoots Dipping in Cooling Polymer Solution

- **Objective:**

To find out the best timing of application.

- **Methodology:**

- 8 treatments (based on different dates)
- Sirora on PG1
- 25 Shoots from 5 trees

# Shoots Dipping in Cooling Polymer Solution

Treatments	Applied dates	Total number of buds
1	4 <sup>th</sup> July	165
2	11 <sup>th</sup> July	174
3	25 <sup>th</sup> July	154
4	22 <sup>nd</sup> August	153
5	29 <sup>th</sup> August	148
6	11 <sup>th</sup> July & 22 <sup>nd</sup> August	154
7	25 <sup>th</sup> July & 29 <sup>th</sup> August	153
8	Control	149

# Shoot dipping trial

- Phenology will be monitored.
  - Bud burst
  - Fruit set
  - Blank nuts
- Evaluation:

Chill accumulation will be related to the Phenology.



# Polymer and Winter Oil Trial – CMV Orchard

- **Objective:**

To replicate the preliminary study (2018/19) at commercial level.

- **Methodology:**

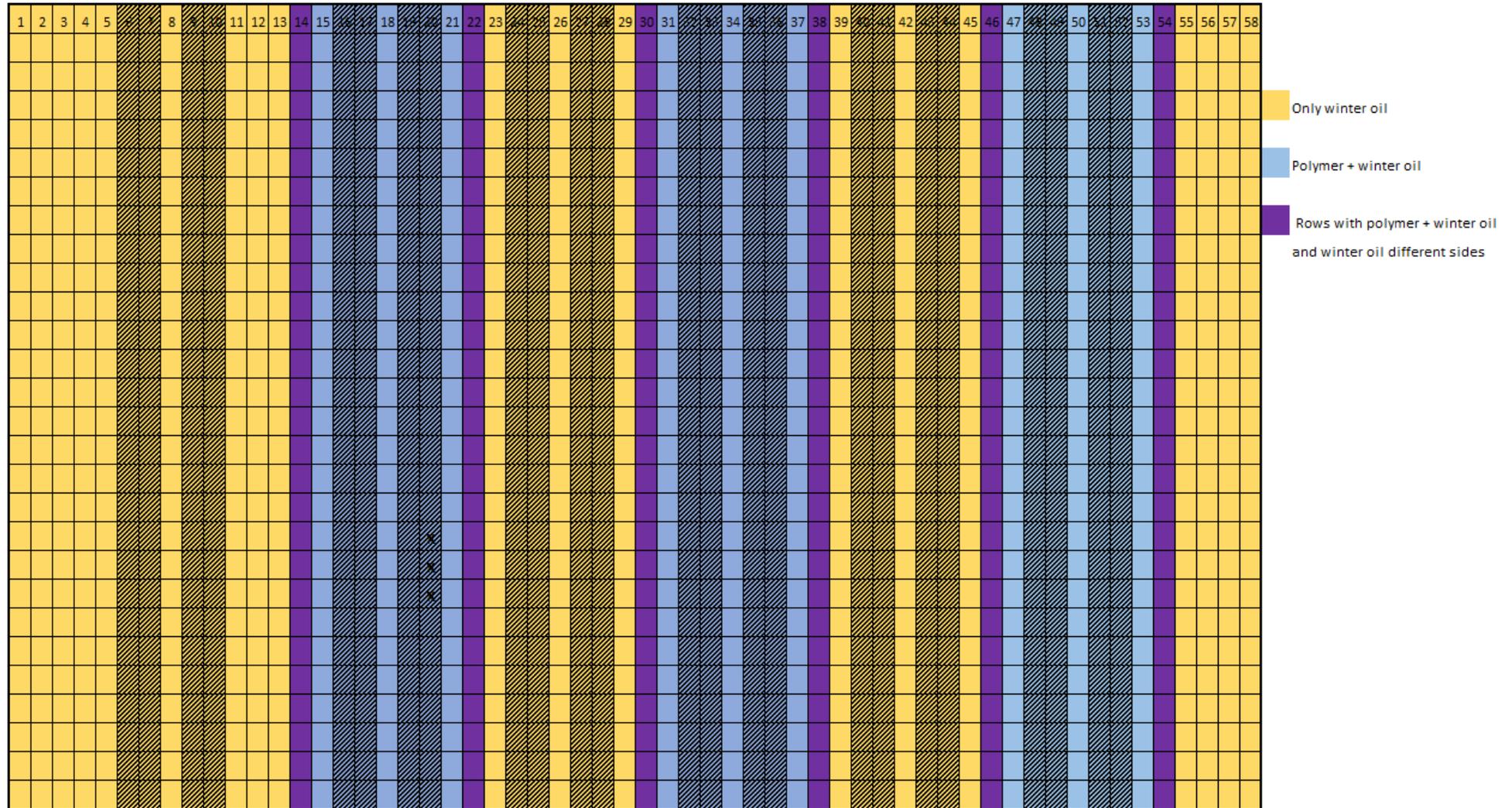
- 5L Polymer was applied at 1500L/ha to Sirora on PG1, Block 3, CMV orchard.
- 7 days after winter oil application.
- Polymer application - 31<sup>st</sup> of August.
- Winter oil application - 24<sup>th</sup> of August.

# Polymer and Winter Oil Trial – CMV Orchard

## - Treatments:

- Polymer and winter oil - 5L Polymer and 6%, 3000L/ha - winter oil treatment.
- Only winter oil - 6%, 3000L/ha winter oil.
- Only polymer (3 trees).

# Layout - Polymer and Winter Oil Trial





# Polymer and Winter Oil Trial – CMV Orchard

- Bud temperatures is reordered from early September – early October in each treatments.
  - Diurnal temperature will be assessed.



# Polymer and Winter Oil Trial – CMV Orchard

- Temperature differences – Significant ( $p < 0.05$ ) 2°C temperature reduction in the polymer and winter oil application plots than only winter oil plots.
- Temperature differences from directions.
  - N – 2.9°C
  - E – 3.4°C

# Polymer and Winter Oil Trial – CMV Orchard

- Phenology will be monitored.
  - Bud burst
  - Fruit set
  - Blank nuts

# Polymer and Winter Oil Trial – CMV Orchard

- **Evaluation:**

- Yield and quality parameters will be assessed.

# Polymer only trial - Agriculture Victoria (mid area)

- **Objective:**

To assess the responses of polymer application.

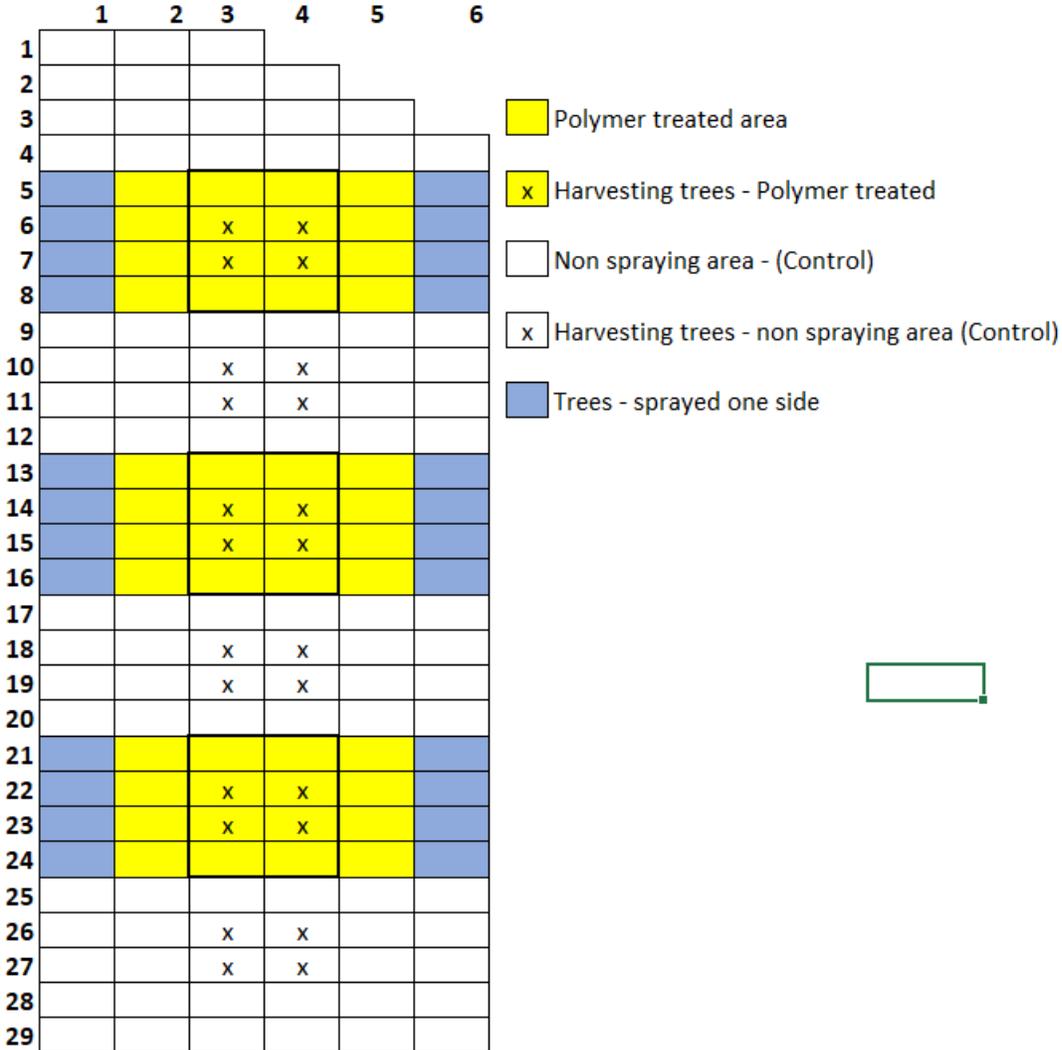
- **Methodology:**

- 5L Polymer was applied at 1500L/ha to 72 trees (tree basis trials).
- Applied on 30<sup>th</sup> of August.
- Temperature measurements –Laser thermometer, spot measurements.

# Polymer only trial- Agriculture Victoria (mid area)

- Treatments:
  - 5L Polymer
  - Control
- Tree basis trial:
  - 72 trees - 5L Polymer
  - 96 - Control

# Layout - Polymer only trial



# Polymer only trial- Agriculture Victoria (mid area)

- Temperature measurements – no significant difference (overall & from four directions).

# Increasing Zn absorption

- Zn deficiency is the third most common deficiency in deciduous trees and widespread throughout all pistachio-growing areas.
- Mostly common in younger tissues due to its immobility (Beede et al. 2016).
- In the spring, symptom of Zn deficiency is the delayed opening of vegetative and flower buds by as much as a month. This delay gives the appearance of cold injury to the 1-year-old wood in the upper canopy (Beede et al. 2016).

# Zn deficiency



Zn deficiency in young plants.

# Zn deficiency



Little leaves



Dark red nuts

# Increasing Zn absorption

- **Hypothesis:**

- Zicron is more effective than current recommended standards.

- **Objective:**

- To increase Zn uptake and Zn mobilization.

# Increasing Zn absorption

- **Methodology:**



# Increasing Zn absorption

- Sirora trees on PG.
- Zicron application – 4 applications (foliar and fertigation).
- Zn chelates – 4 applications.
- Control - No Zn applications; 5 rows.

# Increasing Zn absorption

- **Data collection:**
  - Before application - Assessed the shoot tips separately from 3 areas.
    - Soil analysis.
  - After application - Assessed the shoot tips separately from 3 areas just before the harvest.
- **Analysis:**
  - Zn content in the shoot tips will be evaluated at before and after scenarios.

# Young Kerman study

- **Objective:**
  - To find out the factors cause low yield in young Kerman.
- Long term study.
- Basic data collection.

# Young Kerman study

- KP orchard
- CMV orchard
- Chislett Farms
  
- Developing trial proposal to assess vegetative and reproductive growth of young Kerman trees with management practices.

# Study of male pollen

- **Hypothesis:**

Nut quality is different from different types of pollen/male trees.

- **Objective:**

- To assess nut quality i.e. high nut size; lower closed shell.

# Study of male pollen

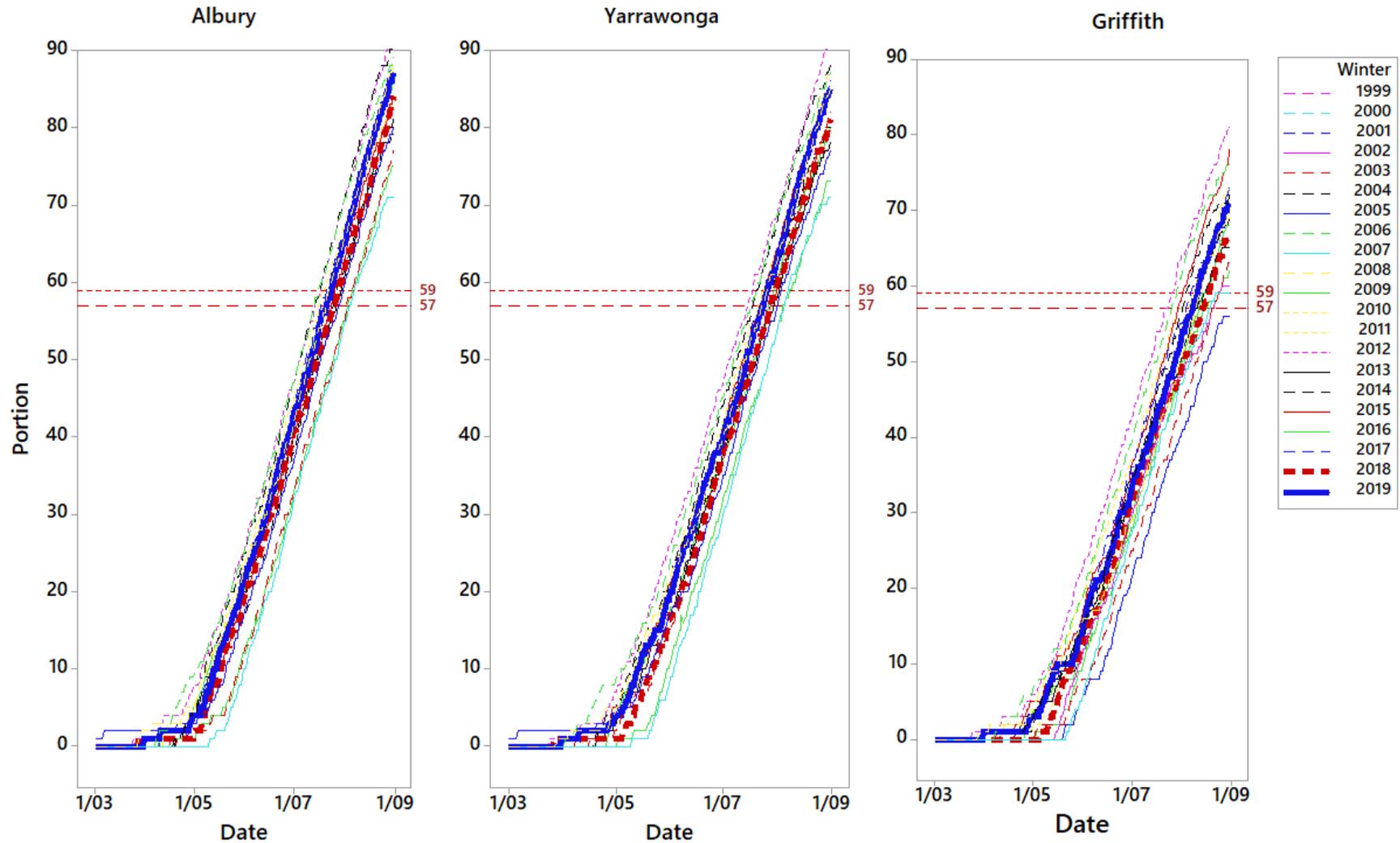
- Preliminary study
- Types of Pollen:
  - PT 198 - Green
  - PT 129 - Blue
  - PT 134 - Red
  - PT 22 - Peters' (Martin's place)
- 5 times application.

# Study of male pollen

- Collecting pollen and applying different male pollen to the same female tree.
- Harvesting – hand harvesting nuts separately based on different males.
- Quality will be assessed separately based on different pollen types.

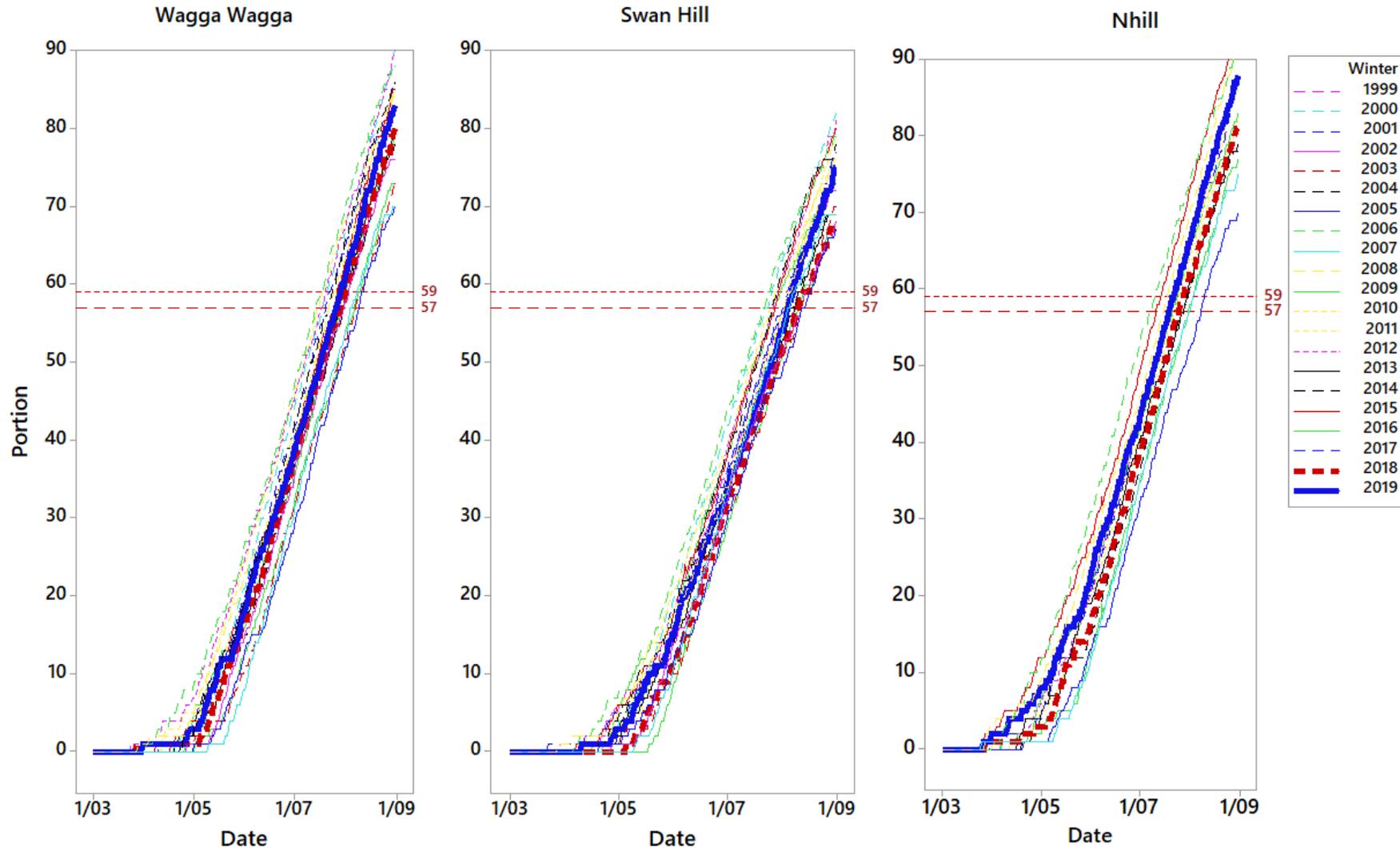
# Chill accumulation as at 31-08-2019

## Dynamic Model



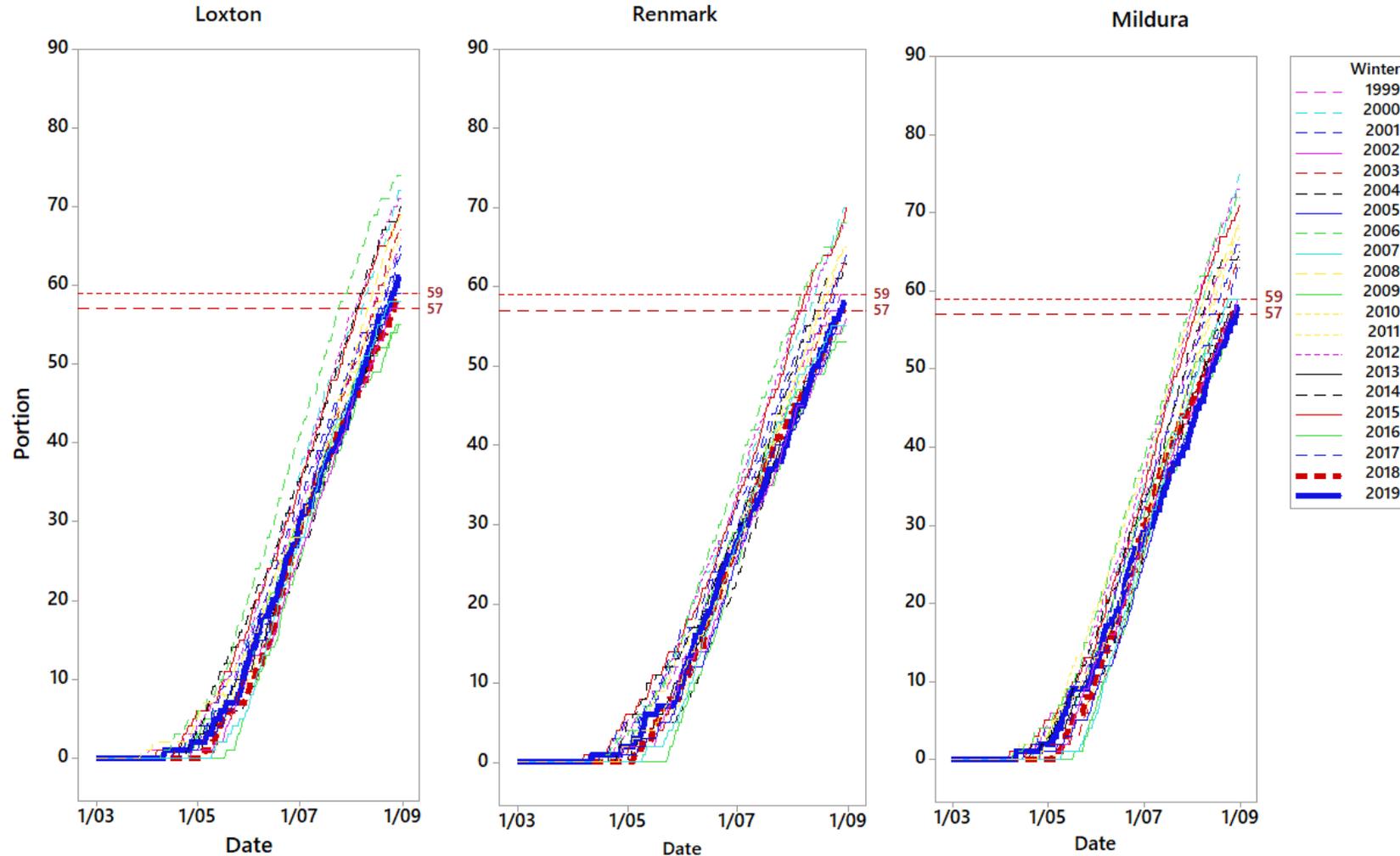
# Chill accumulation as at 31-08-2019

## Dynamic Model



# Chill accumulation as at 31-08-2019

## Dynamic Model



# Acknowledgement

- Ryan, Phil and staff – CMV farm for support these trials.
- Andrew – Kyalite Pistachio for assisting trials.
- Martin, Theo and James Simpfendorfer for the support given throughout the preliminary polymer trial.
- Dr Michael Treeby and staff – Agriculture Victoria for supporting the trial.

**Thank you**



**Pistachio Growers' Association**

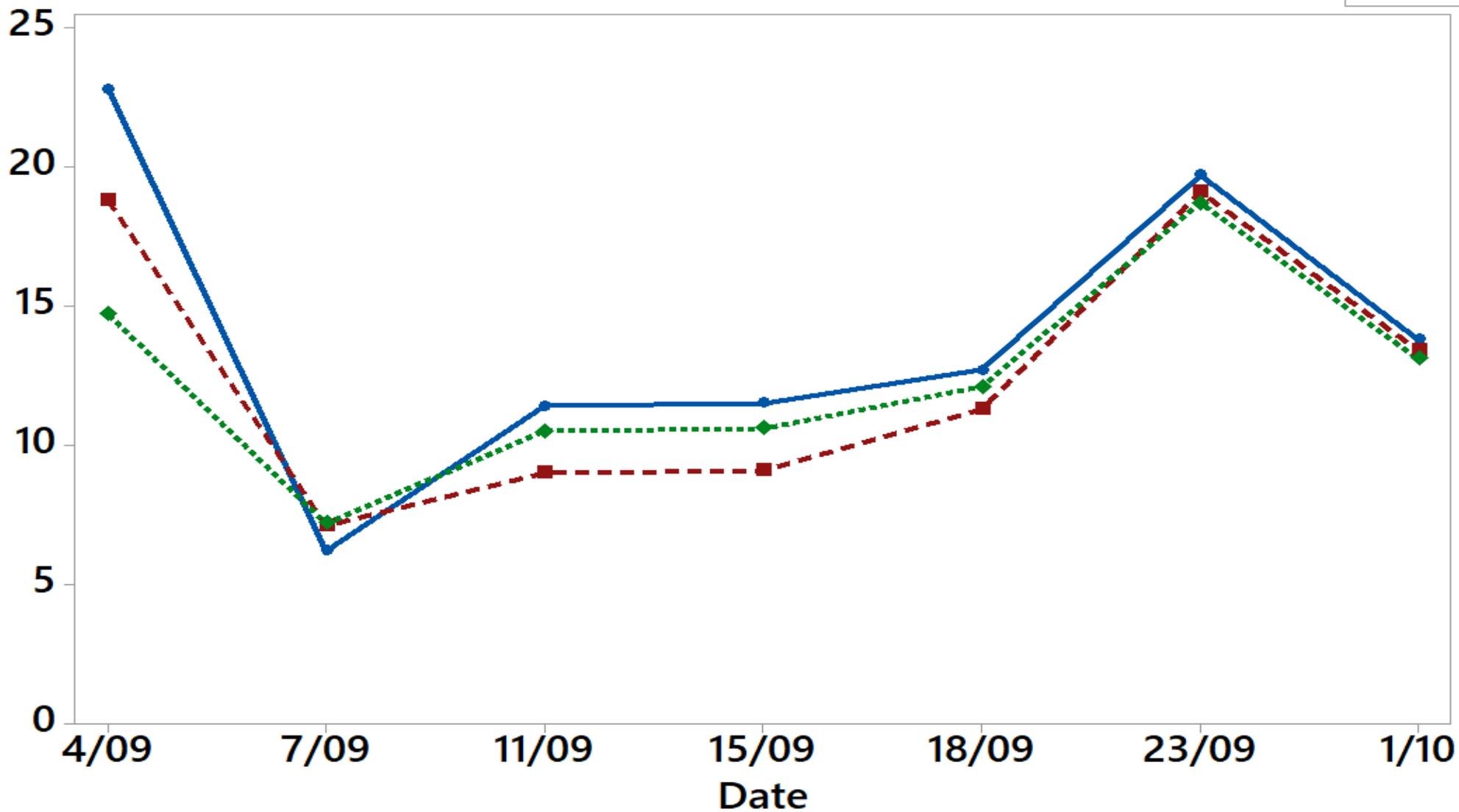
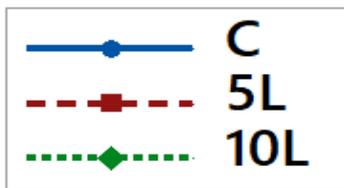
**Hort  
Innovation**  
Strategic levy investment

**PISTACHIO  
FUND**

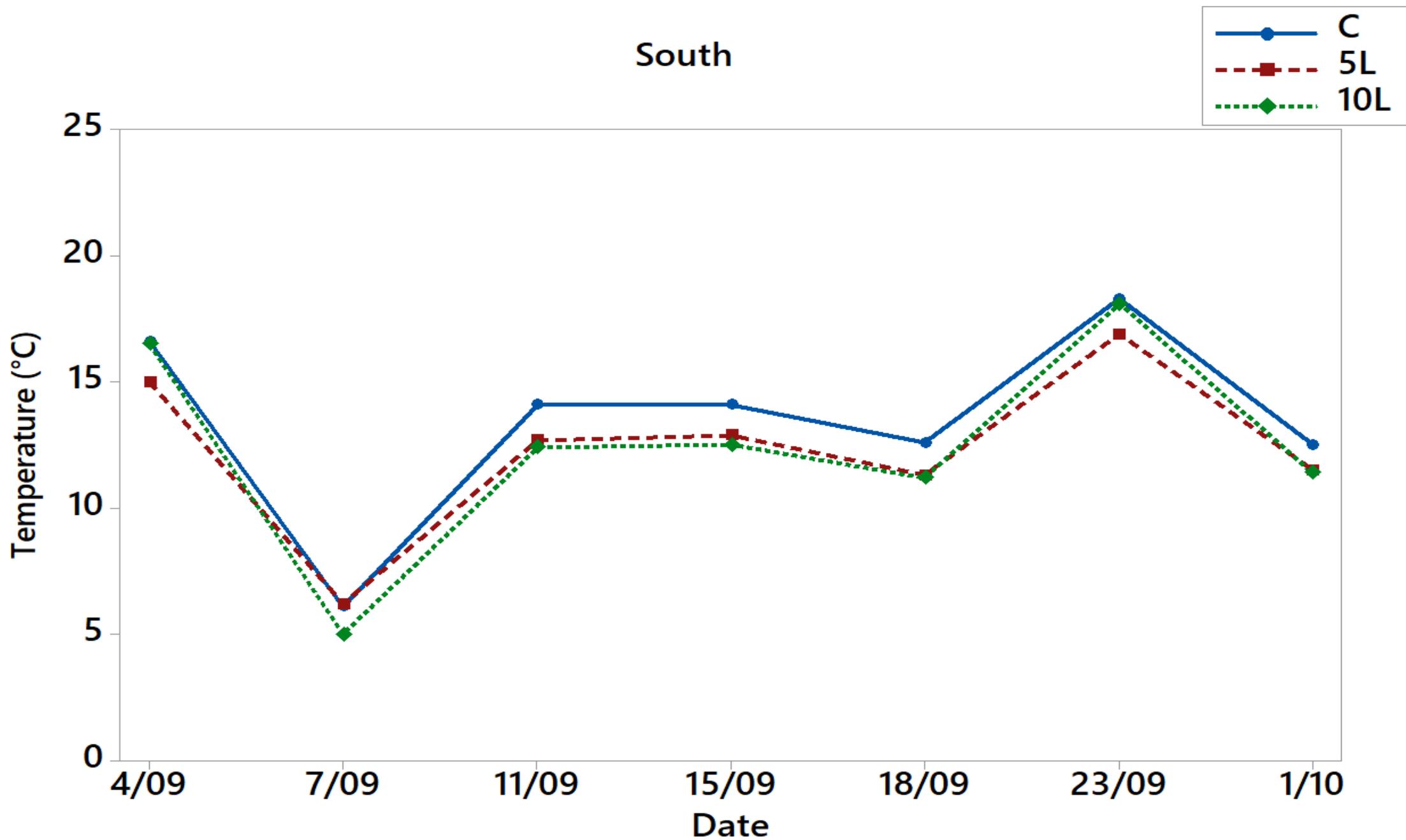
Additional slides

# North

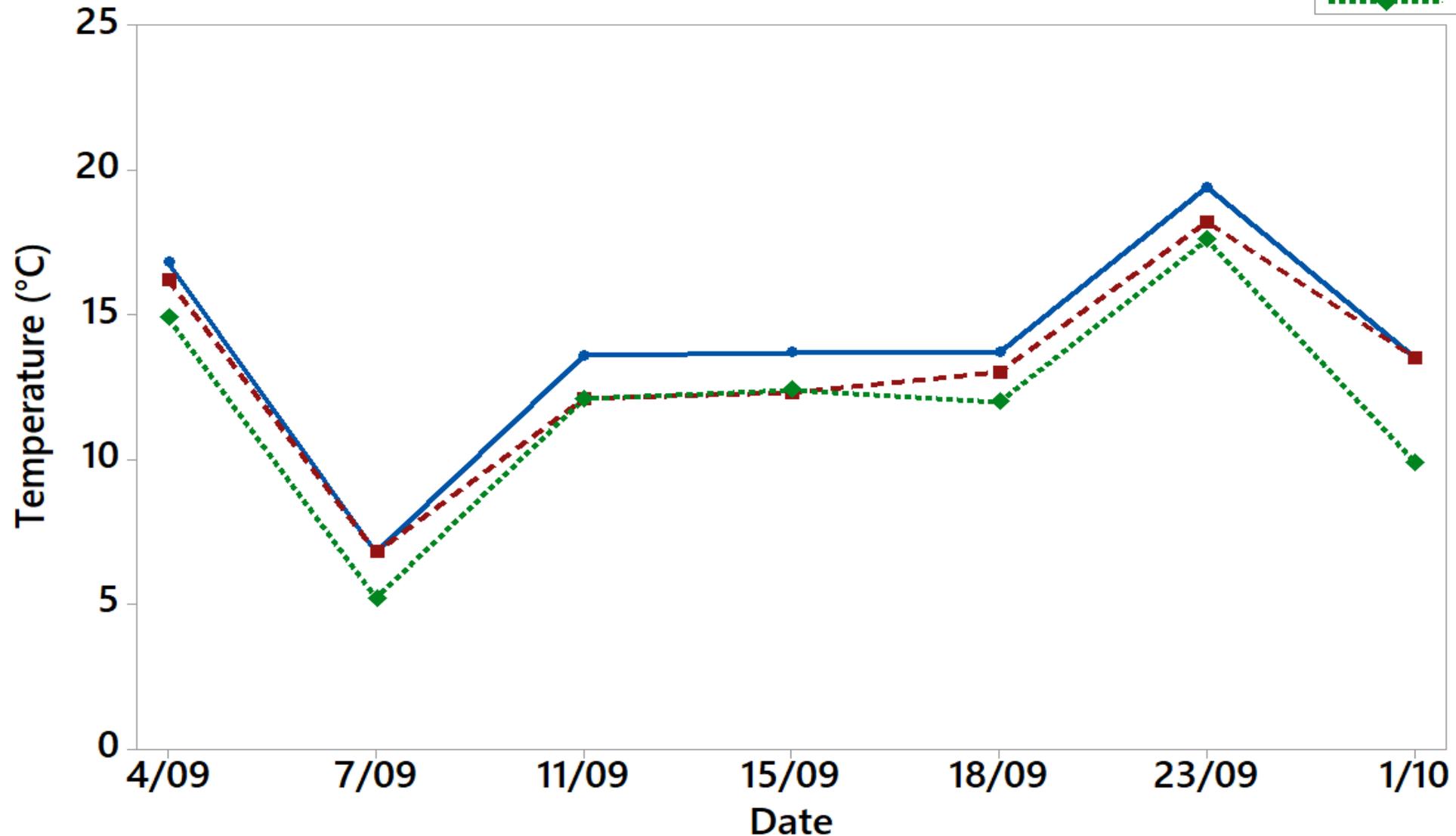
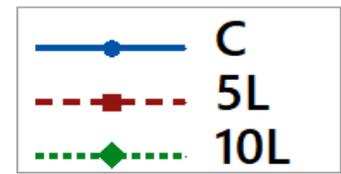
Temperature (°C)



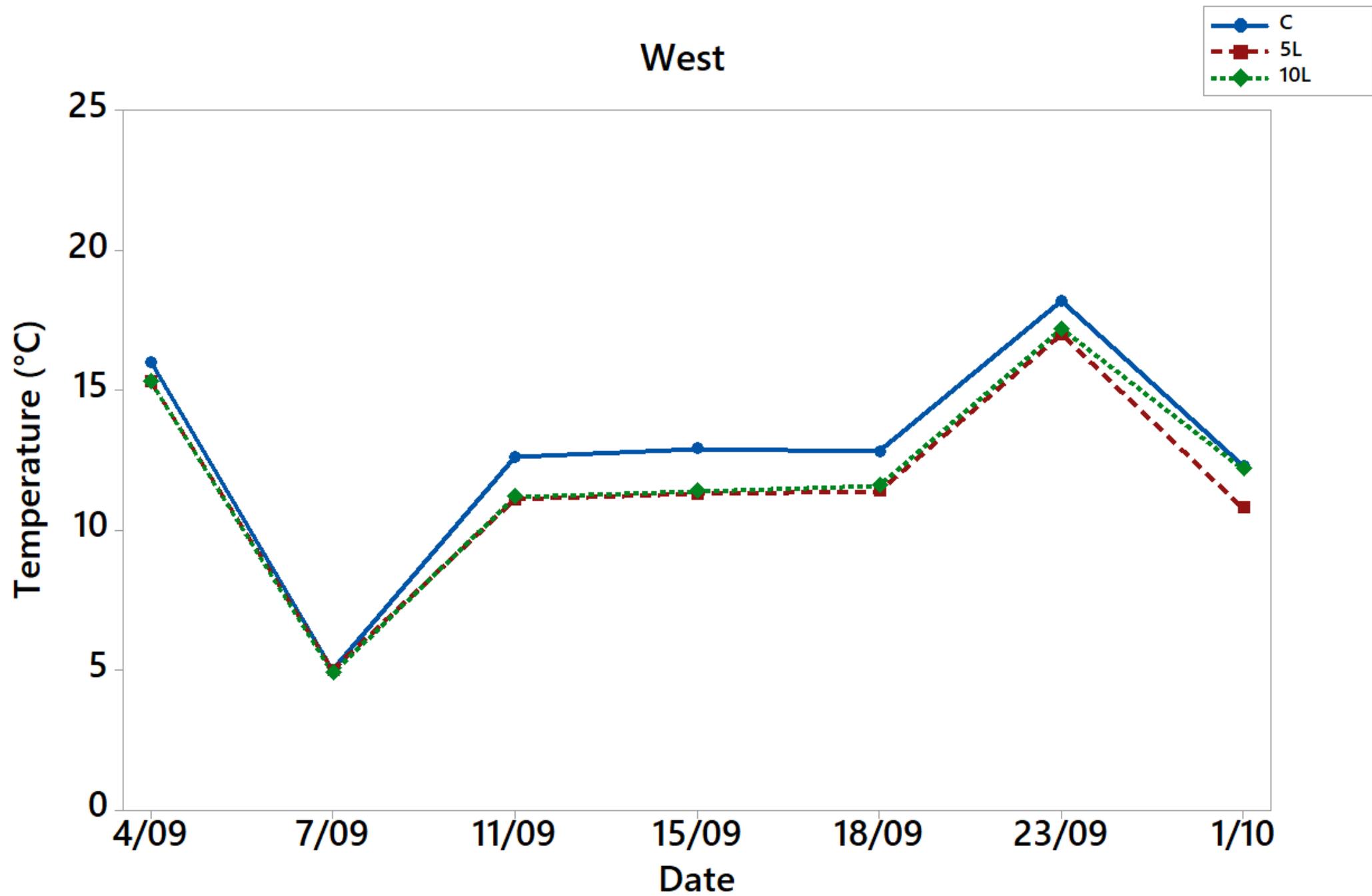
# South



East



# West



# Increasing Zn absorption

- An one of method increasing Zn absorption and movement is application of Complex Polymeric Polyhydroxy Acids (CPPA) technology.
- CPPA has ability to move nutrients through the phloem (Brown 2014).
- Normally, it is not recommended to apply Zn in to the soil.
- However, this can be applied to the soil due to stimulation ability .