
THE ALMOND CONFERENCE
50
YEARS

CEU INSTRUCTIONS: HOW TO RECEIVE CREDIT

VIA QR CODES

1. **Separate QR codes will be provided** at the start and end of each session. Participants will scan QR code with their smart phones where their check-in/out times are recorded and will provide their information.
2. **The QR codes can be found on the stands at the** entrance of each session.
3. **The check-in QR codes will be pinned 10 minutes** before the session starts and available until 10 minutes after the presentation has started. The check-in QR code will be removed after 10 minutes into the session to prevent late attendees from checking in.
4. **The checkout QR codes will be provided 5 minutes** before the session is scheduled to end, and available for 15 minutes afterwards before being removed.

VIA ATTENDANCE BOOTH

1. **A staff member will be present** at the attendance booth to help assist participants who are unable to use the QR code.
2. **Attendees will check in before the session starts** and check out after the session is over by filling out a copy of the check-in/out form.
3. **Attendees will provide** name, email address, license type and number, and credit type that they wish to receive.
4. **The same policy will apply** as above for check-in and checkout times.

MONITORING

One to two Almond Board staff members will be present at each session for monitoring attendance. Staff will monitor any attendees who leave at any point during session. They will remind these attendees of their credit being denied and won't allow them to checkout at the end of the session.

CERTIFICATES

- **Attendance information will be tracked** and compiled after the sessions.
- **Course Completion Certificates will only be provided** to attendees that were present for the entire duration of each session.
- **Course Completion Certificates will be emailed** to attendees within 14 days after the conclusion of the conference.
- **No partial credits** will be offered.
- **No print certificates** will be provided. Certificates will be emailed shortly after The Almond Conference.

50 YEARS of The Almond Conference

THANK YOU
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We Want to Hear from You!

The Almond Board is conducting research to understand your experiences, perceptions and needs/wants of The Almond Conference. This information will improve future conferences. During the conference, we'll conduct several focus group sessions and short individual interviews.

Focus Group Sessions

These will be in Room 15 (Level 2–across from Ballroom B-5) during the following times:

Wednesday, December 7, 2022

- 9:30–10:30 a.m.
- 11:45 a.m.–12:45 p.m.
- 4:00–5:00 p.m.

Thursday, December 8, 2022

- 10:30–11:30 a.m.

If you are interested in being a part of the focus group, please use this QR code to select a time!

Short Individual Interviews

Throughout the conference, Vivayic, the research organization, will also ask select attendees about their conference experiences.

Vivayic will have a neon yellow ribbon on their name badges that says, **"Tell me more."**

Please take a few moments to provide your insights if asked.

VISIT THE INCENTIVE AND GROWER SUPPORT ZONE!

This year the Almond Board of California is offering a new and improved ***Incentive and Grower Support Zone***. This is **THE** place to learn about government incentives and other forms of support. Many of these incentive programs began as research projects with funding from the ABC, with proven agronomic benefits.

Grower incentives through federal, state and local programs provide funding for adoption of many practices of interest to almond growers.

Examples of available funding include:

- More efficient irrigation and nutrient management systems
- Cleaner on-farm equipment
- Low-dust harvesters
- Groundwater recharge
- Habitat projects including pollinator hedges
- Navel orangeworm mating disruption and integrated pest management
- Planning grants and many other practices

Located on Level 2 in the Ballroom B Foyer

The tables with agency staff and program materials will be outside the breakout sessions, in the Ballroom B Foyer.

Just keep an eye out and you can't miss it, or ask at the ABC booth for more information.

Food Truck Village

Tuesday. December 6
11:00 a.m. – 2:00 p.m.

Wednesday, December 7
11:00 a.m. – 2:00 p.m.

Thursday, December 8
10:30 a.m. – 1:30 p.m.

Located Outside in the
West Lobby Plaza

OPENING RECEPTION

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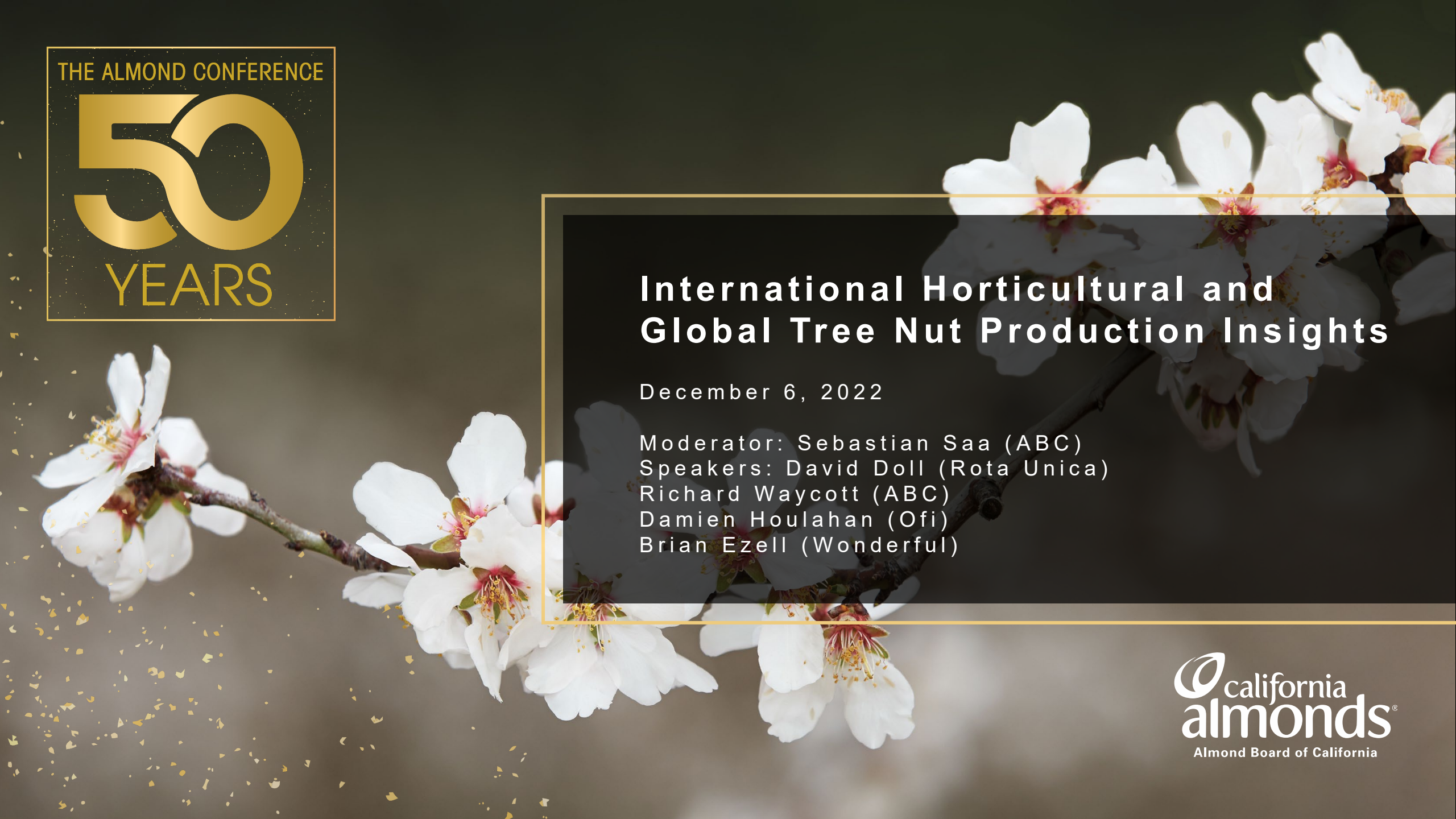
3:30 – 5:00 p.m.
Almond Conference Expo



International Horticultural and Global Tree Nut Production Insights

December 6, 2022

Moderator: Sebastian Saa (ABC)
Speakers: David Doll (Rota Unica)
Richard Waycott (ABC)
Damien Houlahan (Ofi)
Brian Ezell (Wonderful)

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Session Details

International Horticultural and Global Tree Nut Production Insights

Part I: Presentation Style

Moderator

Sebastian Saa, Associate Director, ABC

Speakers

David Doll, Managing Director - Rota Unica
Production Insights for CA Growers Based on European Experience

Richard Waycott, CEO - ABC
Global Tree Nut Production

Part II: Panel Style

Moderator

Richard Waycott, CEO, ABC

Panelists

Damien Houlahan, VP - Olam Food Ingredients

Brian Ezell, VP - The Wonderful Company

David Doll, Managing Director - Rota Unica

Production Insights for CA Growers Based on European Experience

David Doll
Rota Única, Portugal

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Overview of Iberia

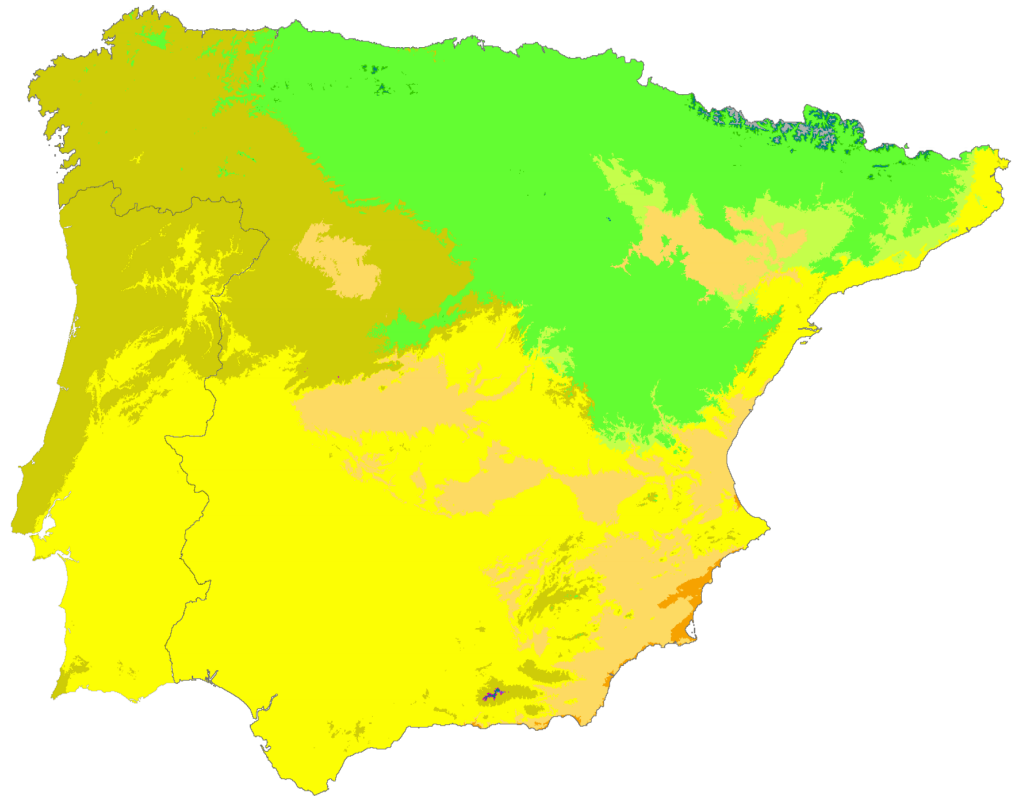
Climate types present

Iberia has varying climates

- Most of the peninsula is classified as Oceanic and Mediterranean
- Some very arid areas within the SE corner of Spain (~Almeria, Murcia);

Most of the almond production areas are Mediterranean, but tend to have higher humidity than California

- ETo is overall less than Central Valley, but closer to North Sacramento Valley
- Annual almond ETc is estimated to range from 42-52”, with water applications less due to precipitation, water supply (24-30”).



Overview of Iberia

Rainfall

Iberia has varying rainfalls:

- Similar to west coast of US;
- Gradient of highest to lowest moves from NW to SE;
- Ranges from 8”- 80;”
- Mountains receive substantial snow, some don’t contain permanent snow fields (e.g. Sierra Nevadas), but provide spring run-off.

Most of the tree nut production areas receive between 16-24”/year

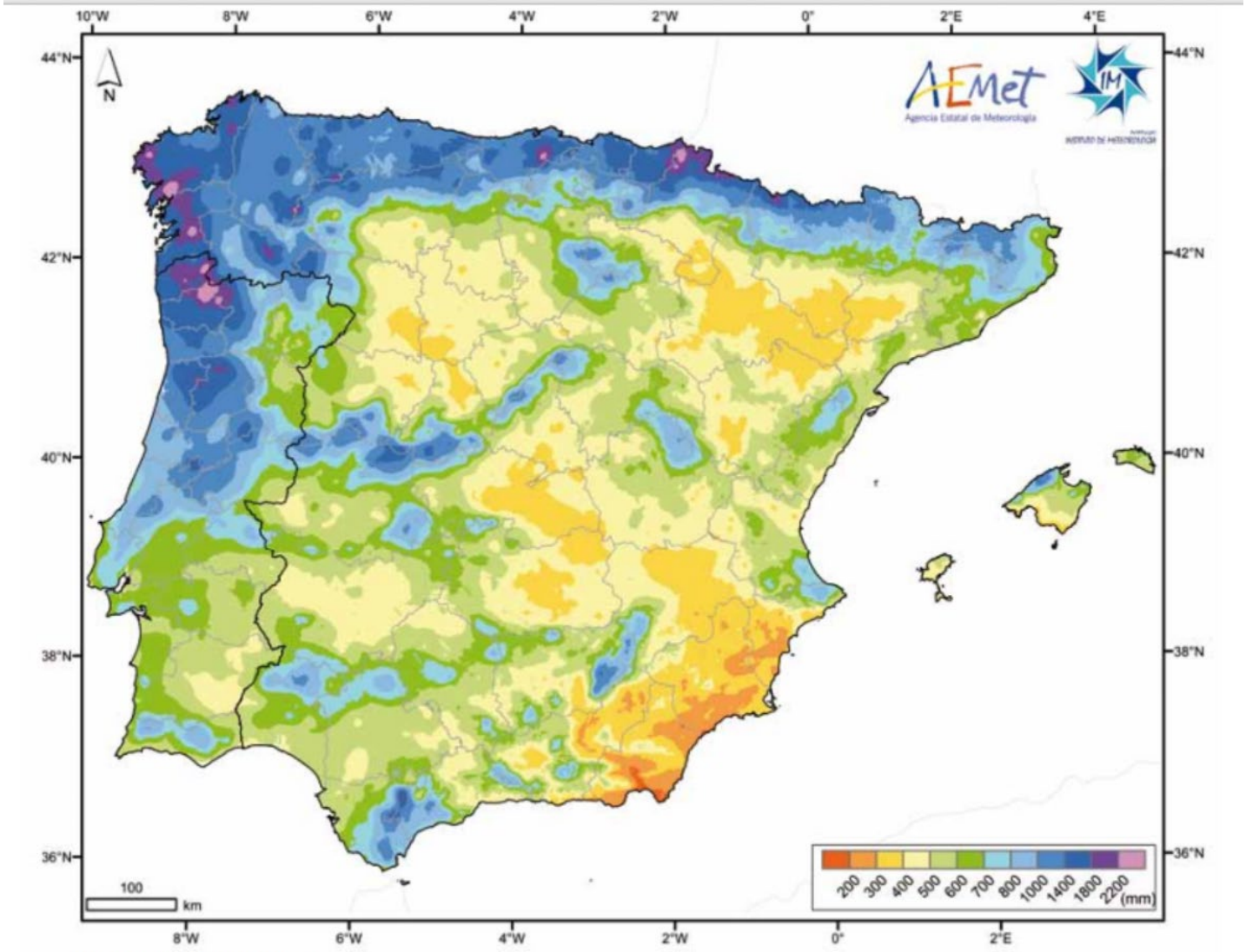
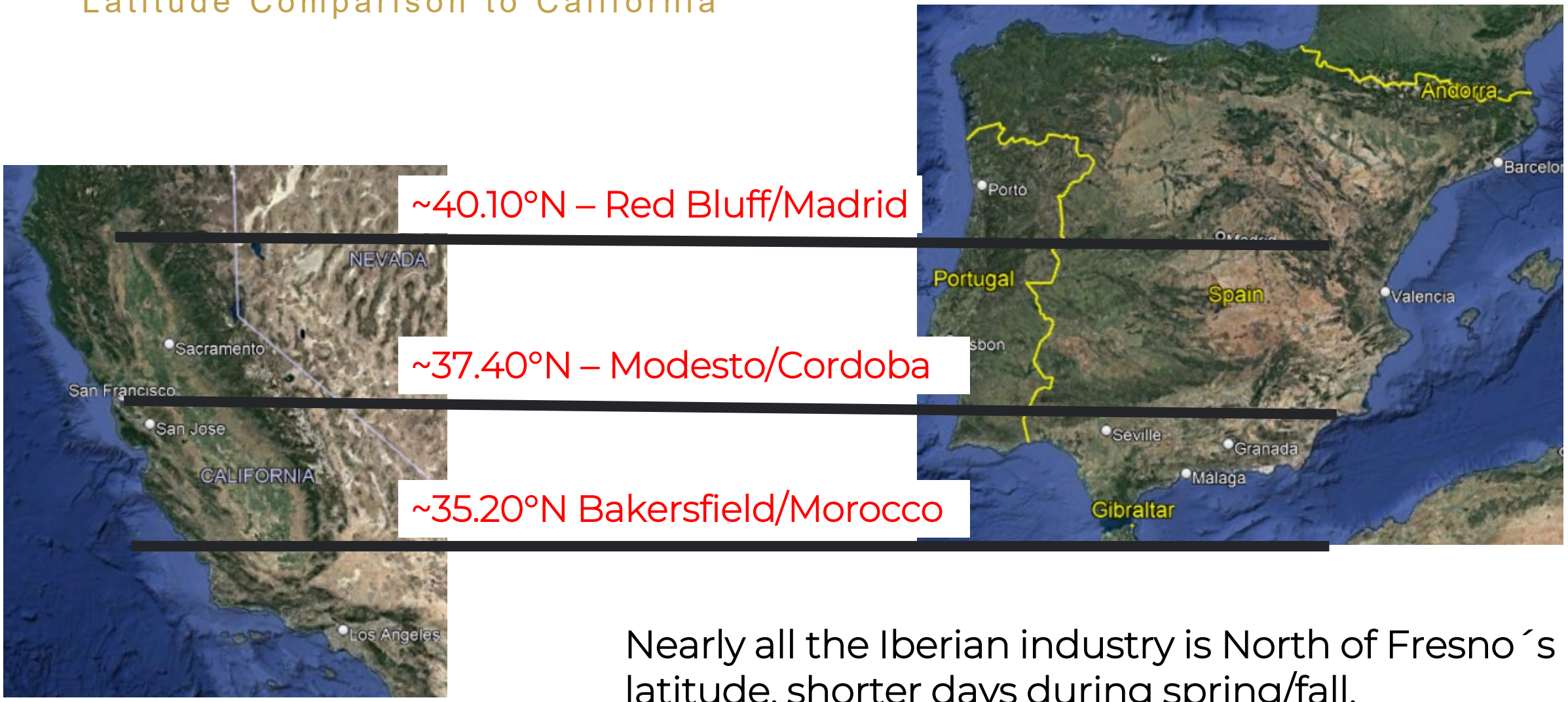


Fig. 69. Precipitación media anual.
Média da precipitação total anual.
Average total annual precipitation.

Overview of Iberia

Latitude Comparison to California



Nearly all the Iberian industry is North of Fresno´s latitude, shorter days during spring/fall.

Overview of Iberia

Source of water

13 Major River Basins in Iberia

- Perennial agriculture occurs mostly within 6:
  - 3 only w/in Spain:
    - Ebro,
    - Júcar,
    - Guadalquivir.
  - 3 shared by Spain/Portugal:
    - Douro,
    - Tejo/Tagus,
    - Guadiana.
- Remaining are utilized for diversified specialty crops;
  - Everything from rice, tomatoes and corn to peaches and berry production.

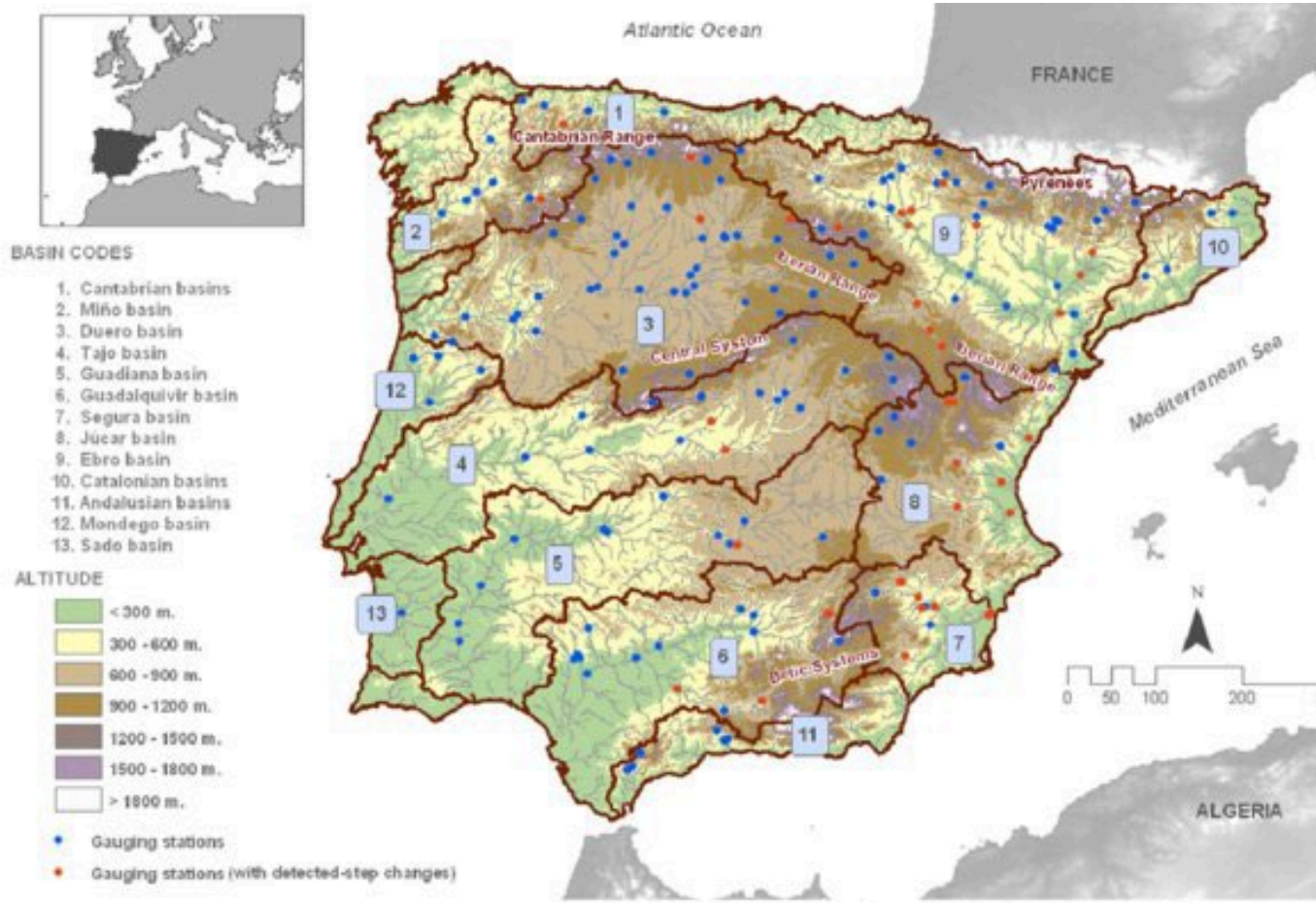


Image source: Lorenzo-Lacruz, et al, 2010

Overview of Irrigation

Source of Irrigation

Spain and Portugal have a variety of irrigation districts, age of infrastructure:

- Surface water is mostly basin drainage, some snow fed rivers;
- Older infrastructure: Acequias/gravity fed channels across limited regions, mostly in Spain due to terrain;
- Modern Infrastructure: Closed pipe, pressurized water deliveries to the field, Spain and Portugal in areas w/variable terrain;
- Reliance on wells and aquifers is common, but “regulated” within many areas, limiting extraction;
- Some desalinization and reclaimed water usage within SE of Spain.

Industry Specifics

Low Density Plantings

A large portion of the almond industry is irrigated only by rainfall:

- Substantial part of the production area;
- Estimated to be about 80% of the total area.

These type of plantings are characterized as follows:

- Widely spaced, low density plantings (<80 trees/acre) with tillage to reduce vegetation in the late spring and summer;
- Hard-shell cultivars, w/a large number of cultivars present, a mix of self-fertile and self-infertile;
- Cultivars grafted to almond rootstocks, which are more tolerant to drought conditions;
- Bloom conditions vary widely based on region and cultivar,
- Inconsistent yielding, ranging from 200-800 lbs/acre depending on winter and late spring rains.

Industry Specifics

"Normal" Density Plantings

Most of the plantings within the past 15 years are considered "normal" density:"

- 100-250 trees/acre;
- Found throughout all of Iberia, where there is irrigation water.

These type of plantings are characterized as follows:

- Modern cultivars sourced from French, Spanish, and American breeding programs, some require pollination services;
- Grafted trees to peach-almond hybrids (GF 677, Garnem), or almond-plum hybrid (RootPacR©) rootstocks;
- Yields range from 1,500-3,000 lbs/acre;
- Irrigation ranges from 18"-32", mostly drip;
- Professionally managed, high producing orchards.

Industry Specifics

Super-High-Density Plantings

Recent trend in planting includes 'Super High Density:'

- 250-1600 trees/acre, size-controlling rootstocks;
- About 25% of the modern plantings in Portugal.

These type of plantings are characterized as follows:

- Row widths are narrow, 13-15', and 3-5' distance between trees. Similar to a vineyard or olive planting;
- Mostly Spanish cultivars which are self-fertile;
- Grafted trees to size controlling plum-almond rootstocks from the RootPac series;
- Highly mechanized with off-the ground harvesting;
- Require irrigation, but less than HD – 18-24" w/single line drip;
- Tend to be managed professionally, with chemical applications to prevent diseases, weeds, and insect pests.
- Yields are higher than LD plantings, but lower than HD plantings due to canopy management practices- 1,000-2,500 lbs/acre depending on cultivar and irrigation practices;
- Higher establishment costs than HD or LD systems.

Industry Specifics

Super-High-Density Plantings

SHD Orchards do have harvestable crops 20-24 months after planting, 500-700 lbs/acre.
Second harvest is higher, ranges 1200-2000 lbs/acre. Observed mature orchards yielding 2000-2500 lbs/acre.
Have observed alternate bearing, issues with canopy management.

Industry Specifics

Varieties

Varieties w/in Europe are distinctively different:

- Hard shell, self-pollinating,
- Different susceptibilities to diseases, but generally resistant to insects,
- Thicker skin, with more weight lost when blanching.
- Common varieties include:
    - Guara/Tuono,
    - Marcona and Desmayo Largeta (not self-fertile),
    - Lauranne/Avijor,
    - Vairo,
    - Soleta.
- Hard shell requires hammers to break shells, and kernel:shell ratio is 30-40%.
- Production varies, but high producing irrigated orchards yield 2,700-3,000 kernel lbs/acre have been observed

Shell and kernel of a hard-shell almond.


3,000 lb/acre Lauranne Block

Industry Challenges

Soil characteristics

18” of silt-loam, followed by 18” of clay-loam, 12” of clay

Soils are more variable, depending on location:

- Generally, highly eroded, especially on hillsides;
- Consistent layering with occasional hardpans;
- Nutrient poor (potassium and phosphorus);
- Many are acidic, and have high magnesium content;
- Soil amendments (calcium, phosphorus) and deep ripping (>1.2 meters) should be considered;
- Elevation changes, rocks, requires clean-up.

Rocks and Uneven Ground

Industry Challenges

Mitigation of Terrain Risks

Multiple harvesting systems are used. They include:

- On-the-ground:
  - California model,
  - Shake to tarp and hand collect.
- Off the ground/Shake and catch,
  - Tenias,
  - Inverted Umbrella.

Difficulty of Rain at Harvest

Industry Challenges

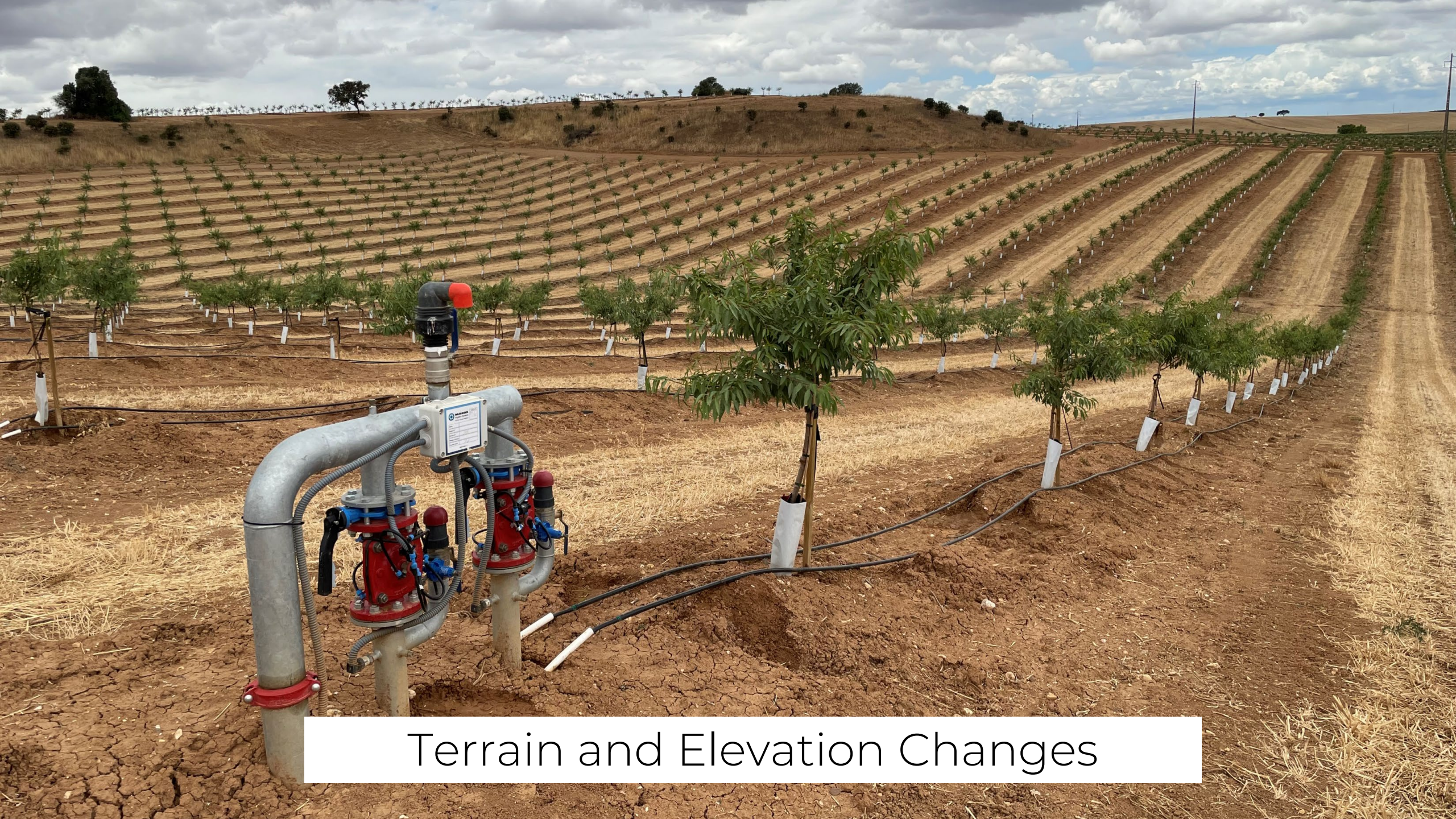
Mitigation of rain at harvest

Rain occurs frequently at harvest.
Management includes:

- Crop removal as quickly as possible due to humid conditions,
- Requires land set aside for drying – about 3-5% will be required, more for self fertile varieties,
- Use of earlier harvesting varieties.

Much of these strategies are used in CA, but different reasons:

- Moving to off-the-ground will require more area for drying,
- Earlier harvesting varieties can reduce NOW and aflatoxin.



Terrain and Elevation Changes

Industry Challenges

Irrigation install

Terrain features limit irrigation system;

- Very common to have 100’ (30 m) of elevation change within a field;
- Must be considered at irrigation design.

To manage variable terrain, a variety of technologies are utilized:

- Smaller irrigation sets that are typically 5-10 acres in size, allowing for improved water mngmt;
- Flexible polyethylene pipe for secondaries;
- Automated valve controls using monocable/decoder system;
- Drip with pressure compensating emitters.

Industry Challenges

Irrigation system development

Irrigation automation is considered a necessity for Iberia:

- Multiple valves utilized to improve DU:
  - Elevation changes;
  - Soil limitations, variability.
- Water is sourced from pressurized hydrants or canals:
  - Canals flow into on-farm reservoirs to be pressurized;
  - Hydrants have maximum flows, limiting application amounts.
- Just “normal,” simpler, and more competition for hardware:
  - Systems are usually mono-cable with decoders at valves;
  - Every motor is equipped w/ VFD;
  - Single point of radio control at pump-house with consistent cellular communication.

Industry Challenges:

Diseases and Insects

Dependent on location: treat with fungicides 2-4 times

California	Diseases	Portugal
Yes	Brown Rot	Yes
Yes	Jacket Rot	Yes
Yes	Anthracnose	Yes
Yes	Rust	Yes
Yes	Alternaria	??
Yes	Bacterial Spot	Yes
	Insects	
Yes	Navel Orangeworm	Yes
Yes	Leaf-footed Plant Bug	??
Yes	PTB	Yes
No	Empoasca	Yes
No	Monosteira	Yes

Dependent on location: treat with fungicides 4-5 times

Dependent on location: treat with insecticides 2-3 times

Dependent on location: treat with insecticides 2-3 times

5-6 sprays a year, Insect focused

6-7 sprays a year, Disease focused

Industry Challenges

Expanding EU Regulations

Most of Iberia's problems are associated with rain, but tools are becoming more limited:

- Spring rainfall increases the presence of pests and diseases;
  - In some years, diseases have caused complete crop loss;
  - Anthracnose, jacket rot, rust, Phomopsis, and red leaf blotch are major concerns.
- Impacts of EU pesticide regulations reducing fungicide and herbicide mode of actions:
  - EU wants to reduce pesticides usage 50% by 2030
  - This is occurring by carrot and stick:
    - Multiple fungicides are removed from registration,
      - These include: propiconazole, thiophanate-methyl, captan, ziram, mancozebe, fenebuconazole;
      - Increased resistance occurrence due to reliance on fewer chemistries.
    - Need new chemistries for chemical rotation, funding investment into microbial products.
    - Starting to fund more technical training.

California Industry Considerations

Not convinced SHD systems will provide the return required by California farmers:

- This system is still being iterated and requires more work,
- Current IRR is about ½ of a HD orchard.

Hardshell varieties have a future in CA. A blanchable, high yielding semi-hardshell is more likely.

Trees within new orchards should be trained for multiple harvesting systems:

- On-the-ground, CA style is most efficient unless rocks or uneven soils,
- Off-the-ground will require drying areas that will require land, energy.

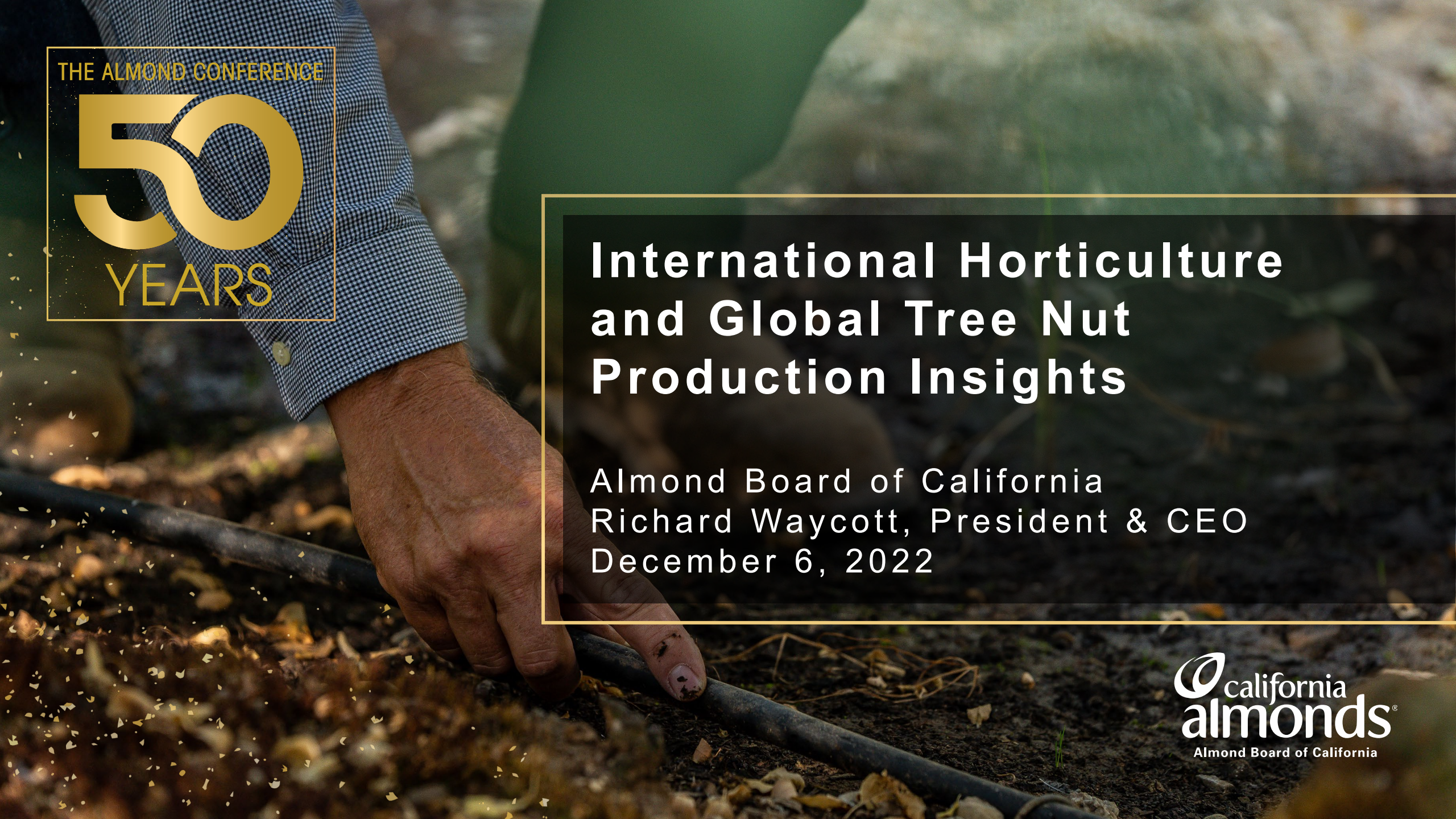
Irrigation systems should be rethought in CA. CA should consider systemic changes, including:

- Irrigation districts should consider pressurization to assist farmers with micro-irrigation (ex. OID)
- Automation systems are over-complicated and should be simplified,
- Smaller valving would provide more control over the system, improved DU.

EU will continue to use MRLs as a trade barrier to protect their interest and farmers:

- EU will reduce pesticide usage by 50% by 2030, and wants to level the playing field with imports.
- Increased reliance on biologicals and gradual erosion of MOAs will continue to occur,
- Biological disease and insect control products are needed for crop quality and import regs.

THANK YOU

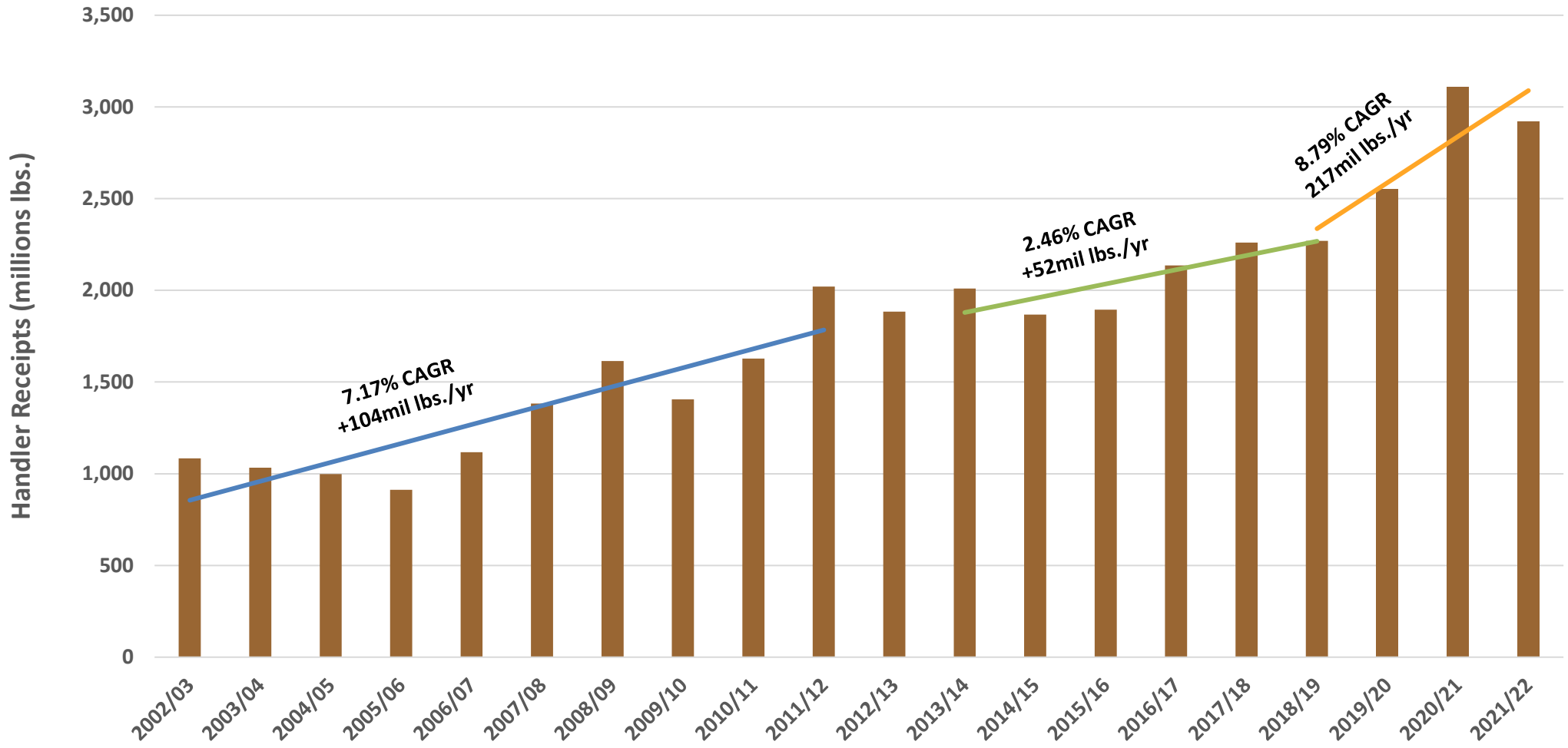


International Horticulture and Global Tree Nut Production Insights

Almond Board of California
Richard Waycott, President & CEO
December 6, 2022

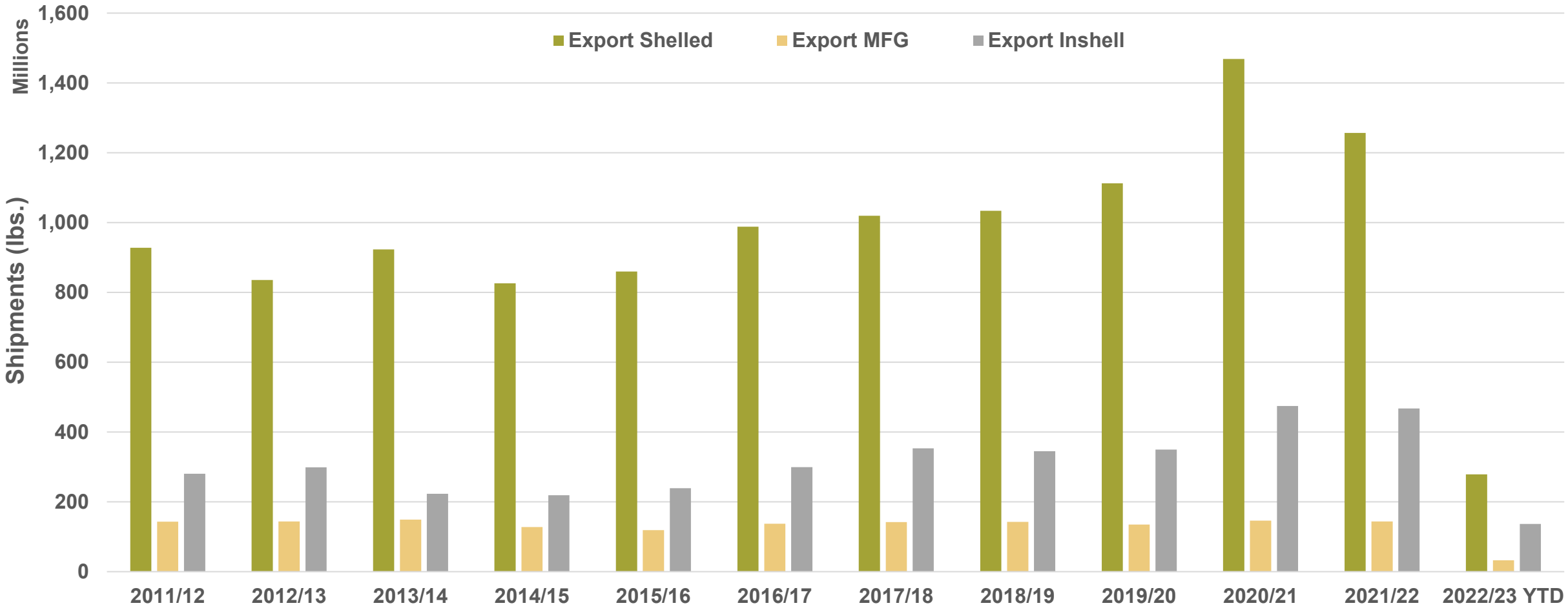
california almonds
Almond Board of California

California Almonds Production Growth – Past Trends (lbs.)



Exports By Product Type

2011 – 2022 YTD



Source: Almond Board of California

Exports By Region – Q1 (Aug-Oct)

2018 - 2022

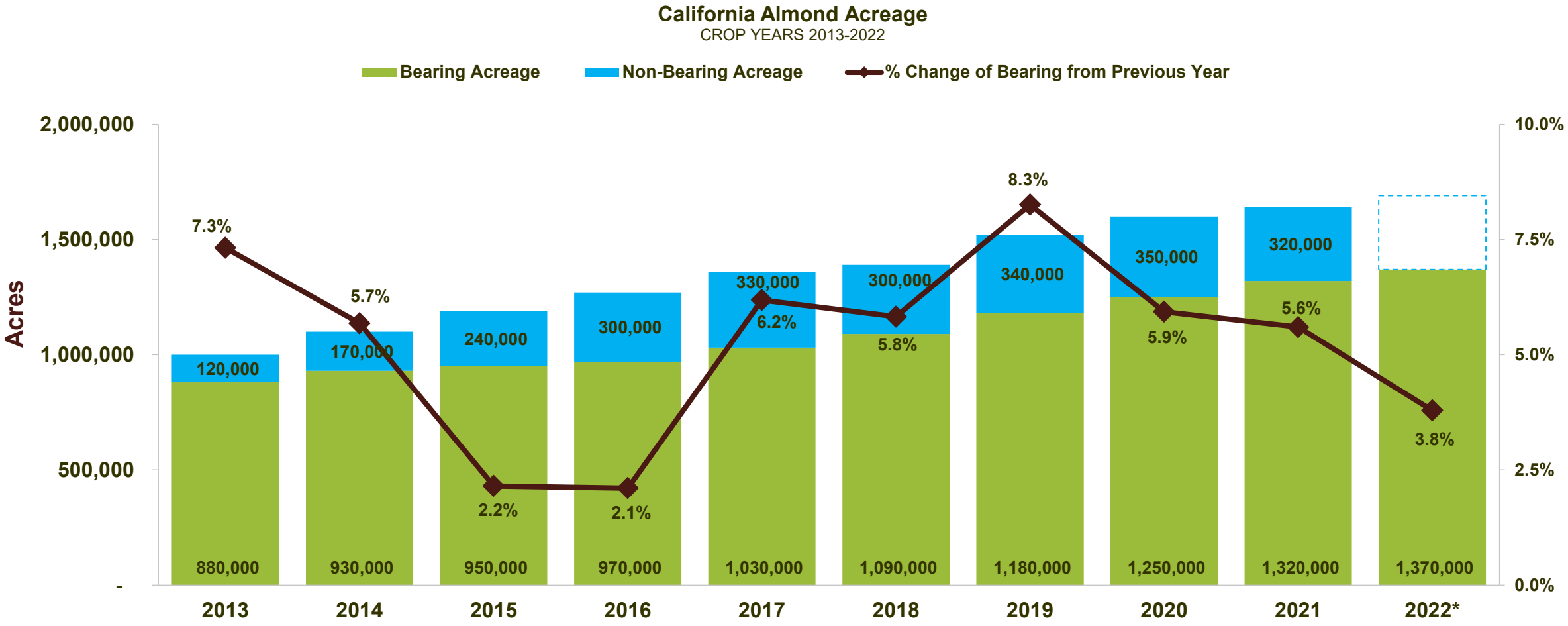
Source: Almond Board of California

How do we right the ship?

- Short term:
  - Working down 2021/2022 carry out (837 M pounds)
    - Maintaining strong shipments
  - Continuing to improve logistics
    - Leveraging relationship with AAC
  - Pedal to the metal - driving the ABC marketing machine

- Medium to Longer term:
  - Expand into new markets
  - Resolve market access issues
  - Evolve almond relevance with younger consumers and new markets
  - Maximize new product development
  - Add value to biomass
  - Drive down production costs
  - California production growth will slowdown

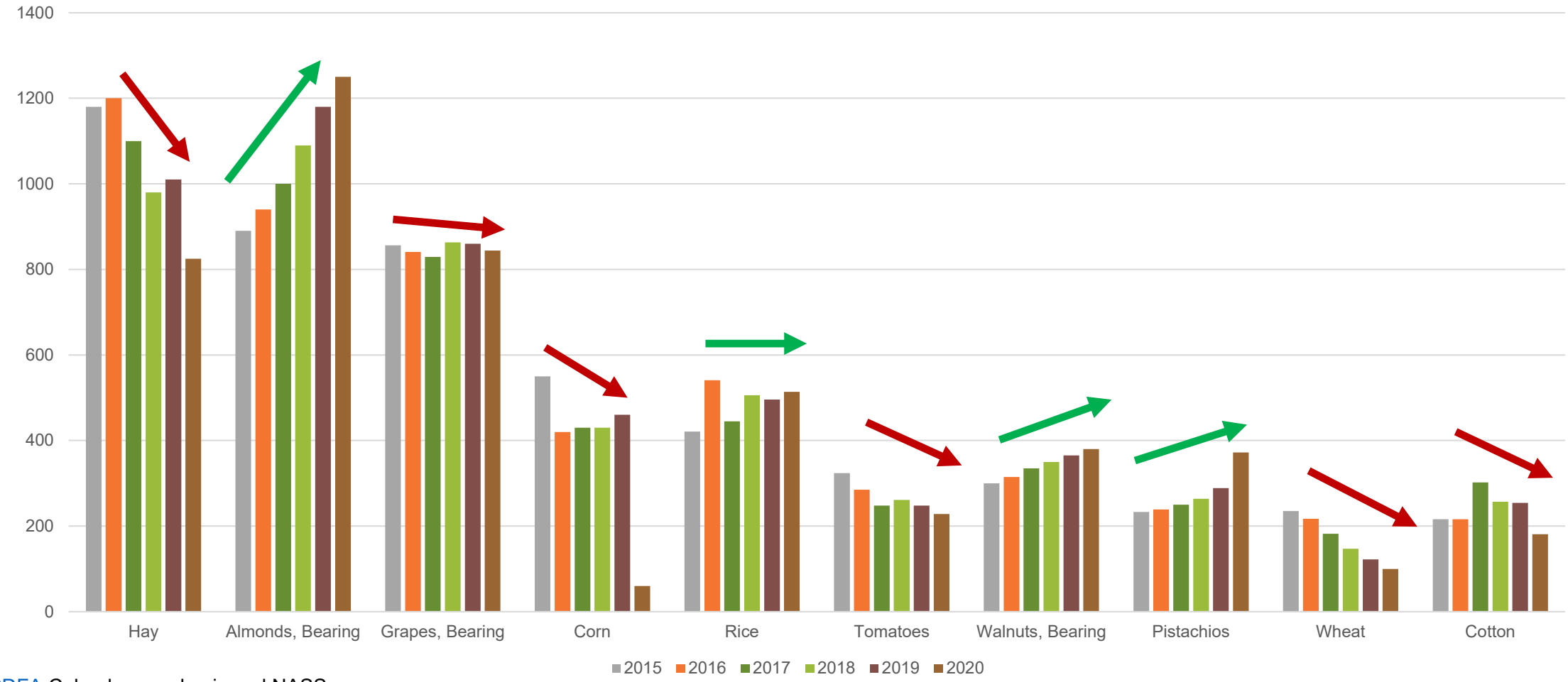
California Almond Acreage



Source: USDA Agricultural Statistics Service, Pacific Region (NASS/PR) 2021 Acreage Report
*Estimate **Non-bearing acreage for 2022 available in April 2023.

Increased Plantings of Permanent Crops

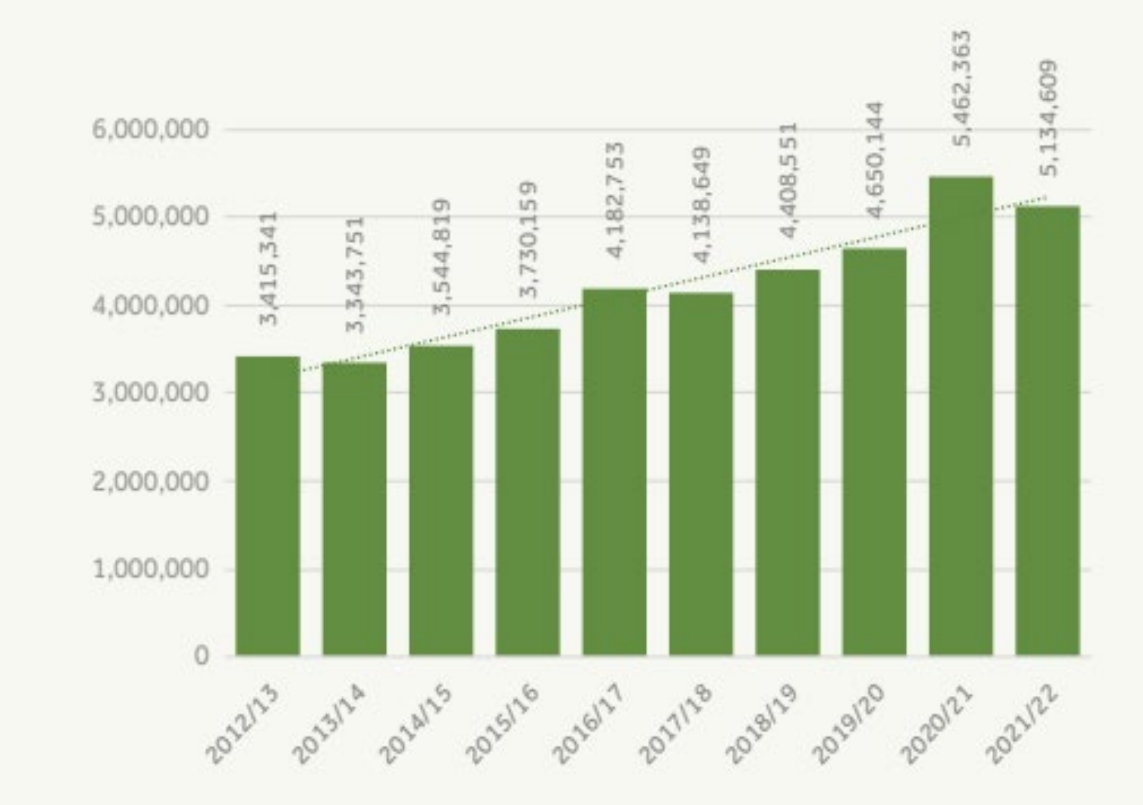
Changes of California Acreage Usage 2015 - 2020



Source: CDFA Calendar year basis and NASS

World Tree Nut Production

World Tree Nut Production
(metric Tons)



Over the last decade, global tree nut production followed an upward trajectory and reached over 5.1 million metric tons in season 2021/2022

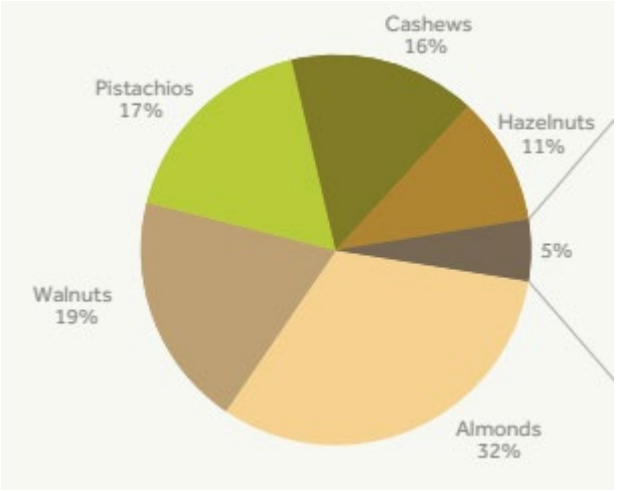
Top Tree Nut Producing Countries
(5-year average metric Tons)

With an average share of 41% (2017/18-2021/22), the USA led the world tree nut production

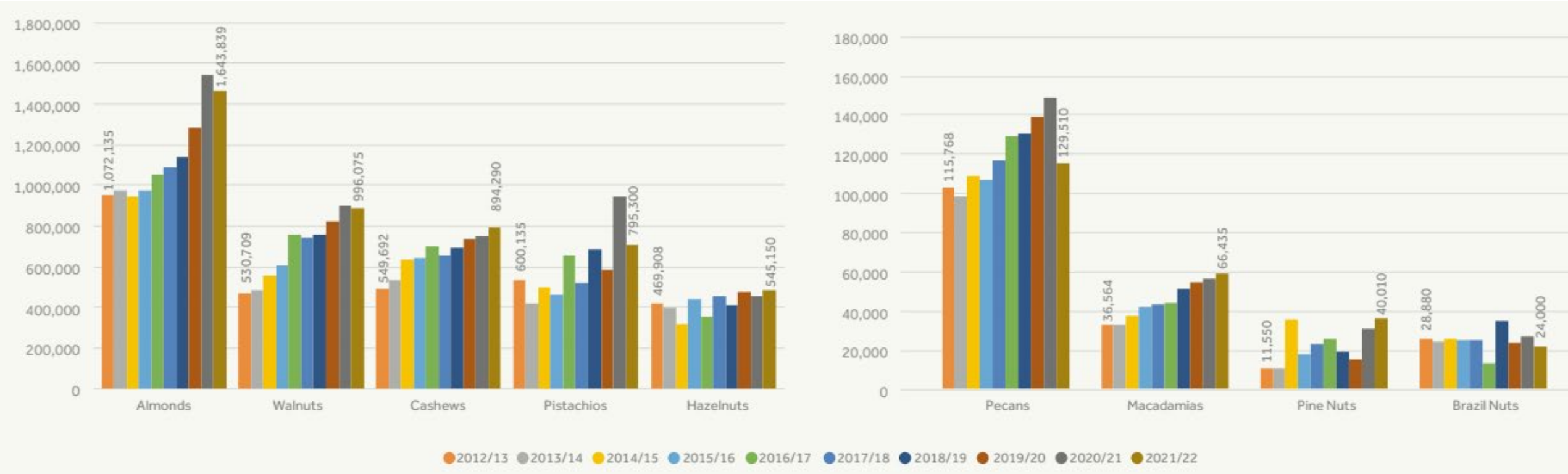
Source: Nuts & Dried Fruits Statistical Yearbook 2021/2022

World Tree Nut Production

Almonds account for 32% of Tree Nut production



World Tree Nut production over the last 10 Years



Source: Nuts & Dried Fruits Statistical Yearbook 2021/2022

THANK YOU