Successional Lettuce Planting at Siena Farms

By: Michael Sushchyk

Introduction

- All information provided in this presentation is a culmination of my experiences and knowledge as a farmer for the last 10 years. As well as drawing from my education at The Stockbridge School of Agriculture and UMass Amherst
- The techniques described here are based upon my time at Siena Farms in Sudbury, MA for the past 6+ years
- I want to make clear that every farm operation is unique
- The processes and techniques outlined in this presentation are meant to be a reflection of Siena Farms Successional Lettuce Planting and how this crop has evolved over time.
- I draw information from my coworkers and peers, past and present, and also from my time at Happy Valley Organics in Whately, MA where I first learned to farm. Thanks to everyone over the years.

Lettuce - *Lactuca Sativa*

- Very old crop - origins going back to Ancient Egypt/Mediterranean area
- Five main types, many different varieties and colors
  - Iceberg type
  - Romaine type
  - Butterhead type
  - One-cut type (salanova)
  - Loose Leaf Type
- Focus on varieties we grow at Siena Farms
- Focus on growing lettuce for heads only

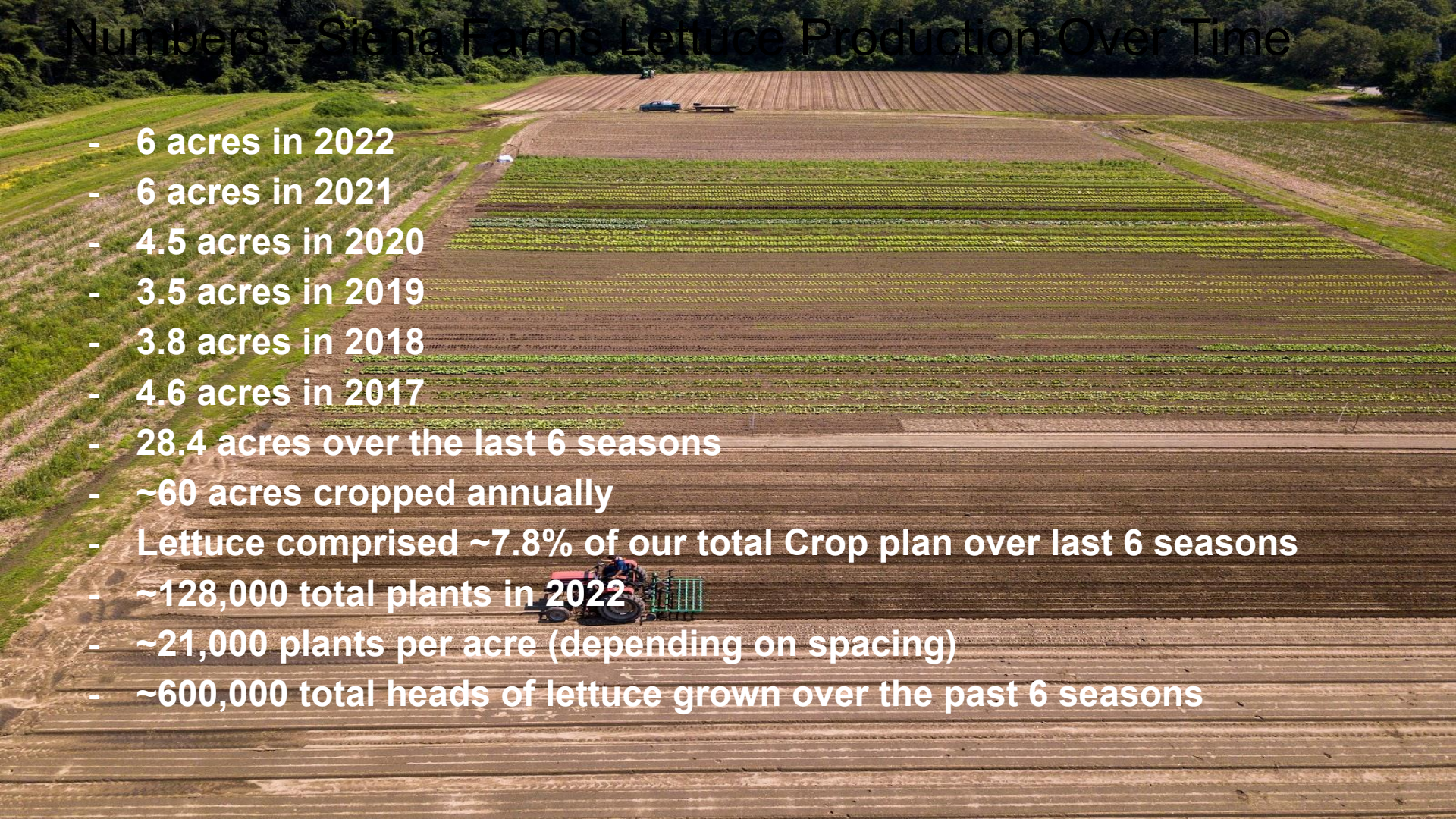
Red Butter Salanova and Panisse Oakleaf Lettuce

Role in the Crop Plan

- Lettuce is grown from late March - Mid-Late October
- Staple crop for Siena Farms - sold in CSA, retail, and restaurant wholesale
- One of the first and last crops planted
- Plant on plastic and use row cover in the spring and fall
- Grow heat tolerant varieties in the heat of the summer
  - Working towards using white on black plastic for summer
  - Working towards using a tractor with creeper gear
- Production techniques constantly improving
- Choosing varieties that help us with efficiency

Farmers transplanting lettuce on plastic in early spring

Numbers - Siena Farms Lettuce Production Over Time



- 6 acres in 2022
- 6 acres in 2021
- 4.5 acres in 2020
- 3.5 acres in 2019
- 3.8 acres in 2018
- 4.6 acres in 2017
- 28.4 acres over the last 6 seasons
- ~60 acres cropped annually
- Lettuce comprised ~7.8% of our total Crop plan over last 6 seasons
- ~128,000 total plants in 2022
- ~21,000 plants per acre (depending on spacing)
- ~600,000 total heads of lettuce grown over the past 6 seasons

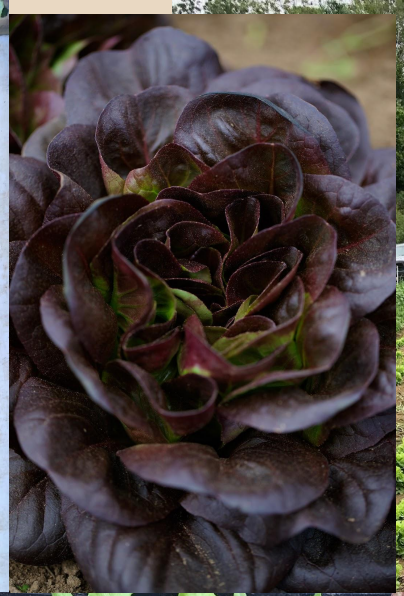
Planting/Timelines

- First seeding of the season last week of Feb/1st week of March
  - Hits the field End of March/1st week of April
- Last seeding of the season end of July/1st week of August
  - Hits the field end of Aug/early Sept.
- Seedings are carried out in the greenhouse on a weekly basis
  - 22-24 weeks of seedings
  - Some varieties are seasonally planted
  - Some varieties are on a 3 week rotation
- Flat numbers are calculated based on estimates for CSA in the winter
  - Buffer increase in flats to make sure there is always enough lettuce
- Flat numbers change seasonally (more in the spring and fall)

Varieties - 2022 Season

- Panisse* - bright green oakleaf (loose leaf)
- Bauer - dark green oakleaf (loose leaf)
- Newham - little gem type mini romaine (romaine)
- Red Cross (ended up taking out of crop plan) - (red butterhead)
- Green Oakleaf - green densely lobed smooth leaf salanova (one-cut)
- Intercut - deeply incised green leaf (one cut)
- Red Butter - smooth red round leaf salanova (one cut)
- Red Sweet Crisp - incised red leaf salanova (one cut)








Varieties - Past Seasons

- Green Batavia - One cut
- Red Batavia - One cut
- Frisygo - One cut
- Rubygo - One cut
- Green Sweet Crisp - One cut
- Red Oakleaf - One cut
- Ruby Sky - Red Leaf
- Crispino - Iceberg
- Nancy - Green Boston Butterhead
- Cherokee - Red Crisp
- New Red Fire - Red Leaf
- Rouxai - Red loose leaf
- Green Forest - Romaine
- Adriana - Green Boston Butterhead

Sought after traits:

- Accurate marketed description
- Reliable and uniform
- Summer heat tolerance
- Attractiveness/color
- Taste/eating quality and texture
- Manageable for CSA packing
- *Upright growth habit - newham

Production Techniques - Greenhouse

- Plant shallow in flats lightly covered with soil or vermiculite
- Optimum germination temperatures are 60-68℉
- High temperatures can cause thermal dormancy - big problem
- Pelleted seed
  - Ease of vacuum seeding
  - Temperature range buffer
- In spring plants should be hardened off before transplanting
- In summer time use shade cloth to keep germinating and growing transplants cool
- Transplants should have strong root system before planting
  - Bare root transplants will suffer/dessicate
- Avoid leaving transplants to get “leggy”
- We use a compost & peat based potting soil and mix in a starting organic fertilizer



Mixing of One-cut varieties during vacuum seeding to achieve desired randomized ratio for ease of harvest.

Thick canopy of full sized transplants ready to be transplanted.

Production Techniques - Field (Spring)

- Tried planting first month of spring crops on plastic this season and cover with row cover
- Pros: Boost in growth speed, harvest quality, uniformity, no cultivation
- Cons: Time and labor intensive, added cost of plastic
- Need to use creeper gear

Production Techniques - Field

- Plant spacing
  - 6 ft center-center beds with 12 in wide tire track (48 in wide bed top)
  - 3 rows per bed
  - 15 in between rows
  - Larger fully sized varieties are planted at 12 in between plants
  - Smaller high density capable varieties are planted at 6 in apart
    - Salanova & Little Gem varieties
- Transplanters
  - Water wheel for plasticulture
  - Mechanical transplanter, carousel type for bare soil
  - Water directly onto/into soil during transplanting with both implements
    - reduce transplant shock
  - Becoming efficient at transplanting is critical to successional planting
  - Know your machine, keep it well lubricated and maintained, avoid breakdowns

- A typical successional planting of lettuce in late spring as seen from aerial view

- Transplant loss visible

- Difference between high and low density visible

Production Techniques - Cultivation

- Lettuce can be a tricky crop to keep clean with mechanical cultivation
- Minimize soil hilling onto lower leaves - do not bury any foliage
  - Bottom Rot *(Rhizoctonia solani)*
- Timing is critical before leaves get too wide
- Upright growth habit varieties are much easier to cultivate effectively
- Minimizing gaps in plantings aids in cultivation - uniformity is key
- Cultivation techniques in order
  - Basket weeder + Tine weeder 5-7 days after transplanting
  - 2nd pass Basket weeder + Tine weeder 5-7 days after 1st cultivation (weather permitting)
  - Alternatively the 2nd pass can be a finger weeder, preventing soil hilling at this stage can be difficult
  - 3rd pass cultivation can be a light shallow sweep cultivation
    - optional depending on weed pressure

- A farmer performing a 2nd pass cultivation on growing lettuce

- Tines should be deep enough to remove thread stage weeds but not too deep to rip out transplant.

- Calibration of cultivation equipment based on crop stage and field conditions is always recommended

- Speed is a variable in calibration but is necessary to create enough vibration to knock weeds loose

- A properly cultivated planting of Panisse lettuce

- A few small weeds may be visible after the final cultivation. This is ok

- The crop is ready to grow to harvest size weed free

Production Techniques - Water and Nutrient Management

- Maintaining a good moisture level in the soil is important to growing nice full heads of lettuce
- Drip Irrigation most efficient and does not wet foliage
  - Costly for short term crop such as lettuce
- Overhead irrigation great but don’t over-do it
  - Can cause increase in foliar diseases if conditions permitting
- Avoid planting into dry, dusty, or friable soil if possible
- Lettuce can be prone to a number of nutrient deficiencies and surpluses
  - Tip burn - Calcium (moisture levels critical)
  - Nitrogen - excess can cause plants to grow too quickly, becoming leggy and bolt
- Consulting a crop production guide helpful for nutrient management
- University of Massachusetts Amherst New England Veg Management Guide
- Taking a soil test recommended

Production Techniques - Pests and Diseases

- Generally, I do not spray pesticides on lettuce unless necessary
  - Lettuce is a quick crop
  - Pesticides are expensive
  - Spraying is time consuming and pulls labor from other tractor tasks
- Utilization of crop rotation to prevent pest build up
- Incorporate crop residues after harvest
- Cover cropping
- Resting the soil - building up natural predators and soil microbes
- Conservation Tillage
- Adding compost to increase soil organic matter
- Scouting for pests and getting ahead of an outbreak is key
- Mammalian Pests - Whitetail Deer and occasionally Groundhog
- Consult a Vegetable Management guide

Harvest Techniques - Field

- At Siena Farms, we tend to move quickly through lettuce plantings
- Picking at the right size
  - Cherry pick vs. clear pick
- Cleaning any diseased or damaged leaves
  - Cut high enough above the initial lower leaves
  - When on plastic, lower leaves will be much cleaner
- Do not crush lettuce heads in container
- Picking during cooler parts of the day
  - Move to shade ASAP when cut
- Moving product quickly from the field to be cooled down and washed

Harvest Techniques - Post Harvest Handling

- Taking the heat out of the plant
- Dunking in wash bins
- Rinse Conveyor - Pressure management
- QC through all stages
- Storing washed lettuce in clean container will help with storage quality
- Cooler - Insulated shipping container with two 25K AC’s and Coolbots
  - 32℉ - 34 ℉ optimal storage temp
  - 98 - 100% relative humidity optimal
  - 2-3 weeks storage life

Season Extension

- Using plastic in the spring
  - Black on black
- Using plastic in the summer
  - White on black
- Using Row cover in the Spring and Fall
  - Boosts temperature
  - Helps protect against cold temps and frost
  - Helps protect against insects (physical barrier)
  - To hoop or not to hoop - that is the question
- Using shade cloth in the summer
  - Have only used in flat production scenario so far
  - Potential for field?
- Growing in Low tunnels under poly film
- Growing in High tunnels (heated or unheated)
  - Hydroponics great way to keep a lettuce crop going year round

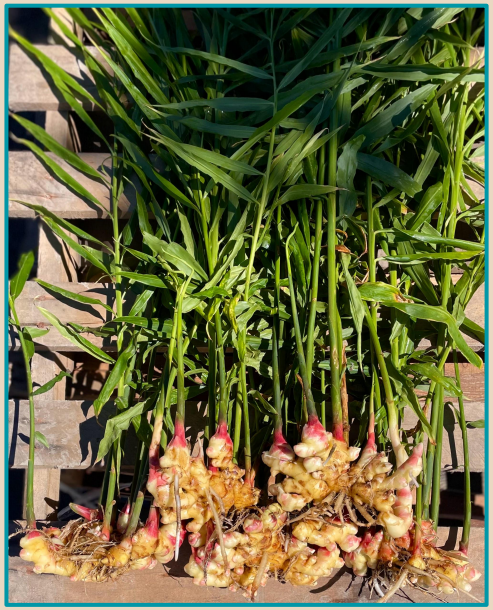
We use a biodegradable plastic product. This product is not OMRI approved for those with Organic Certification. After planting is finished, plastic is either mowed close to the soil level to break into small pieces or disced in. We then use a spader to completely bury all residues. Residue will build up in spader if not properly broken up.

Improvements

- There is always room for improvement
- Primary improvement focuses of late
  - Nutrient and water management
  - Season extension
  - Soil conservation
- Wash and pack efficiencies to come
  - Packing into a washable container is possible
- Would like to go back to doing Mesclun mix again
  - Greens harvester
  - Greens washer with bubbler
- Greens very popular and consistent
  - Great crop to become proficient at

Specialty Crop Production At Siena Farms

By Mishreky Lawandy

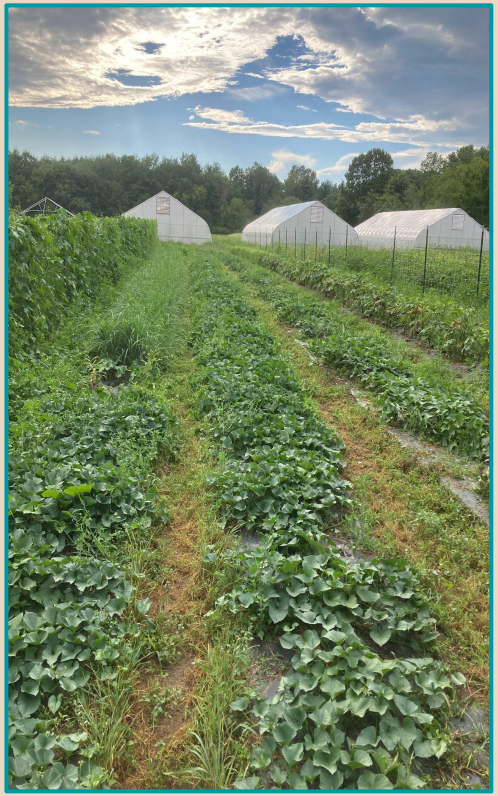


SIENA FARMS
SUDBURY, MASSACHUSETTS

Specialty Crops Program Motivation

Dedicate 2 Acres To:

- diversify farm sales channels as a resilience building measure.
- better serve the needs of our retail customers belonging to the Asian American diaspora.
- increase the number of culinarily relevant crops offered to our wholesale restaurant accounts.
- trial new crops for production at the CSA scale.



Crop Assemblage

RETAIL

- Amaranth Greens
- Bitter Melon
- Ginger
- Turmeric
- Japanese Sweet Potatoes
  - Tubers
  - ~~Greens~~
- Luffa (Immature)
- Wax Melon (Fuzzy Gourd)
- ~~Shiso~~
- ~~Longbean~~
- ~~Edamame~~

WHOLESALE/TRIAL

- Molokhia
- ~~Row 7 Trial Peppers (Striped)~~
- ~~Cardoon~~
- ~~Bitter Eggplants~~

Vegetable Amaranth - *Hinn choy* (Cantonese); *hsien tsai* (Mandarin); *kalunay, kulitis* (Filipino); *cholai bhaji* (Indian); *callaloo* (West Indies)

- Varieties: Red - "Hu Hsein" (*Kitizawa*), Green - "White Leaf" (*Kitizawa*).
- Timeline: Seeded (4/27), Transplanted (5/24), First Harvest (6/17).
- Cultural Practices: 2 Row, 1' Spacing, Black Plastic.

Bitter Melon - *fu kwa* (Cantonese); *ku kwa* (Mandarin); *kerala* (Indian); *nigai uri* (Japanese); *ampalaya* (Filipino)

- Varieties: "Bitter Green" (*Kitizawa*), "Japanese Long" (*Kitizawa*).
- Timeline: Seeded (5/11), Transplanted (6/10), First Harvest (7/28).
- Cultural Practices: 2 Row, 1.5' Spacing, Black Plastic, 6' Trellis + 6" Netting.





Luffa - *Egyptian cucumber/Chinese okra (US); sinqua* (Cantonese); *hechima* (Japanese); *patola* (Filipino)

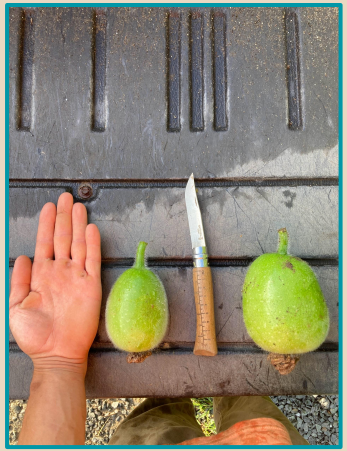
- Varieties: "Dishcloth Gourd" (*Baker Creek Heirloom Seeds*).
- Timeline: Seeded (5/11), Transplanted (6/10), First Harvest (7/28).
- Cultural Practices: 1 Row, 1.5' Spacing, Black Plastic, 6' Trellis + 6" Netting.





Wax Melon (Mature) - *doongua* (Cantonese/Mandarin); *tougan* (Japanese)
Fuzzy Gourd (Immature) - *tsit gwa* (Cantonese); *mao gwa* (Mandarin)

- Varieties: "Round Winter Melon" (*Kitizawa*).
- Timeline: Timeline: Seeded (5/26), Transplanted (6/24), First Immature Harvest (8/5), Mature Harvest (10/7).
- Cultural Practices: 1 Row, 1.5' Spacing, Black Plastic, 6' Trellis + 6" Netting.


Ginger / Turmeric

- Varieties: Ginger - “Peruvian Yellow”, Turmeric “Indira Yellow” / “Hawaiian Red”.
- Timeline: Pre-Sprouting (2/23), Potted Sprouting (3/7), Planting (5/11), Harvest Period (Late Sept-Oct).
- Cultural Practices: 2 Row, 12”, 3” Depth. Hill/Sidedress at 45 and 75 days.





Japanese Sweet Potatoes

- Varieties: Red Japanese - “Murasaki”, Purple Japanese - “Kotobuki”, Okinawan, US Southern Heirloom - “Nancy Hall”.
- Timeline: Transplanted (5/27), Harvested (10/7).
- Cultural Practices: 1 Row (Potential to double), 2’ Spacing, Black Plastic.




Lemongrass

- Varieties: "East Indian" (*Johnny's Selected Seeds).*
- Timeline: Seeded (4/14), Transplanted (6/20), First Harvest (8/15).
- Cultural Practices: 3 Row, 1' Spacing, Black Plastic.




Molokhia - *jute/mallow* (US); *saluyot* (Filipino)

- Varieties: "Molokhia - Egyptian Spinach" (*Kitizawa).*
- Timeline: Seeded (4/27), Transplanted (5/24), First Harvest (6/17).
- Cultural Practices: 2 Row, 1' Spacing, Black Plastic.




Works Cited

- https://nevegetable.org/crops/lettuce-endive-and-escarole
- https://store.extension.iastate.edu/Product/Harvesting-and-Storing-Vegetables
- https://www.johnnyseeds.com/vegetables/lettuce/
- https://www.johnnyseeds.com/growers-library/vegetables/lettuce/lettuce-key-growing-information.html
- https://en.wikipedia.org/wiki/Lettuce
- McCue, Susan, and Claudia Meyers, editors. Specialty and Minor Crops Handbook. 2012. Bowker, https://doi.org/10.1604/9781879906389.

THANK YOU

Successional Lettuce Planting and Specialty Crop Production At Siena Farms

Mike Sushchyk & Mishreky Lawandy