

SUMMER LETTUCE PRODUCTION IN THE SOUTHEAST

Systems and Research

Celia Barss, Woodland Gardens

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SNOW'S BEND FARM

Established in 2004

Lease 180 acres, grew on about 10 at peak

Outside of Tuscaloosa, Alabama

2 owners, full-time job for both

Parents of 2 children (13 and 10)

Diversified vegetables and cut flowers

Diversified market

- CSA (300 at peak)

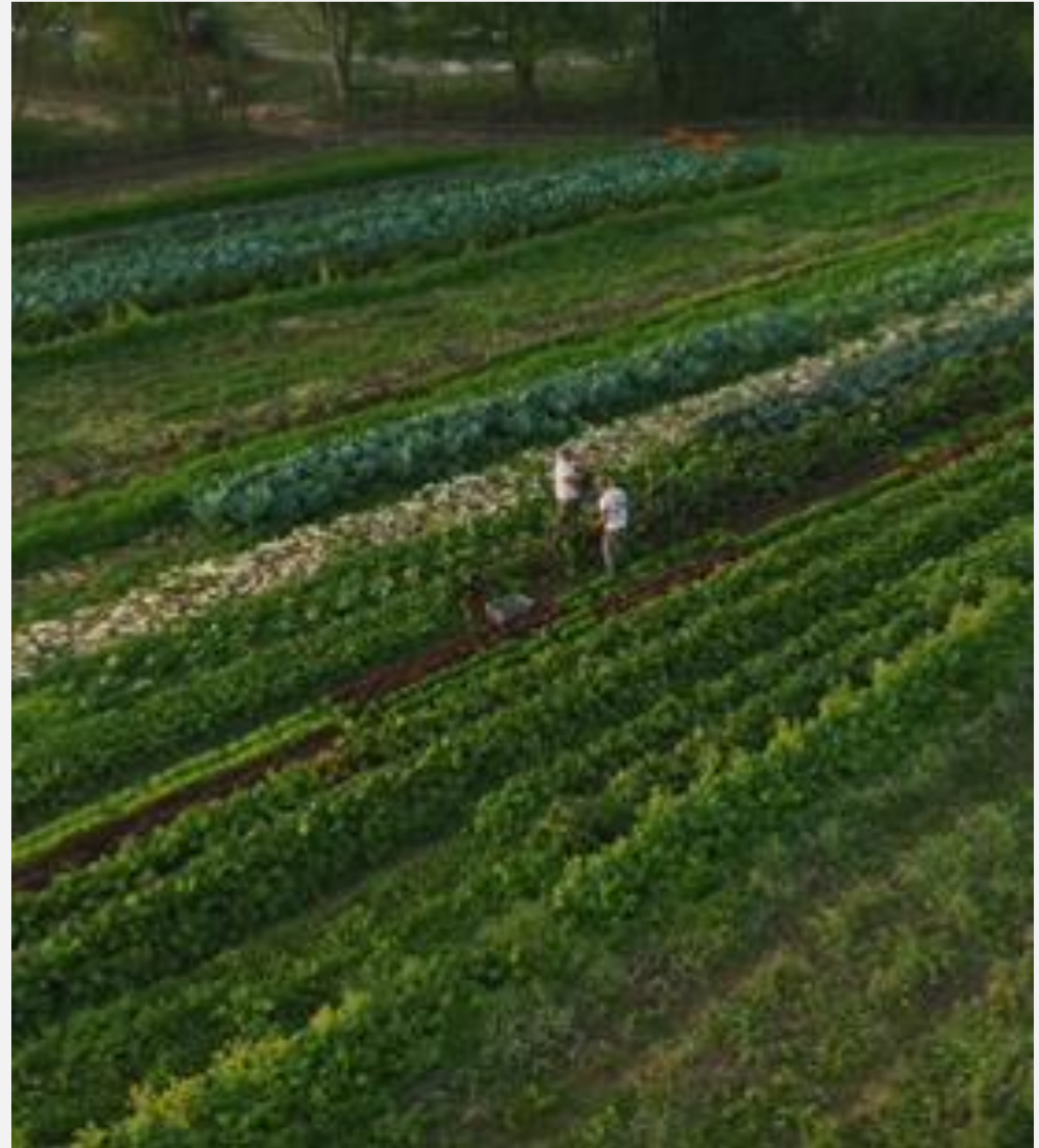
- Farmer's Markets (3 at peak)

- Restaurants (15+ at peak)

Staff of up to 10 at peak

Re-envisioning since 2023

Downsized in all areas



RESEARCH ON SNOW'S BEND FARM
FUNDED BY A SOUTHERN SARE
PRODUCER GRANT



PHYSIOLOGICAL RESPONSES OF LETTUCE TO HEAT STRESS

- **‘Bolting’** is the process of rapid stem elongation prompted by the shoot apical meristem (SAM) and marks the transition from vegetative to reproductive growth (Chen et al, 2018). Allowing a head of lettuce to develop and grow into the largest head and greatest weight possible before the process of bolting begins is desirable. The ideal number of days until harvest varies with cultivar, treatment, and external conditions due to weather.
- **Sesquiterpene lactone** is a specialized plant metabolite, an antiherbivore agent (Taiz and Zeiger, 1991), which causes a bitter flavor when lettuce is damaged or grown in high temperatures.
- **Double heading and splitting**
- **Rib discoloration and sun spots**

Goals

- 1.To determine if shade cloth or Proteknet aid in production of summer lettuce in Alabama.
- 2.To trial specific cultivars of heat-tolerant lettuce.
- 3.To determine if producing head lettuce during summer months is a profitable endeavor.

METHODS

SUCCESSIONS OF LETTUCE WERE PLANTED, **EVERY TWO WEEKS**, STARTING IN MAY IN THE GREENHOUSE.

EACH PLANTING CONSISTED OF A MINIMUM OF **THREE HEAT-TOLERANT CULTIVARS** OF LETTUCE AND A MAXIMUM OF FOUR.

BEDS WERE PRE-IRRIGATED AND MULCHED WITH WHITE PLASTIC.



CULTIVARS:

‘Cherokee’ (Johnny’s Seeds)
‘Lovelock’ (High Mowing Seeds)
‘Conversion’ (Seedway)
‘Bergam’s Green’ (Johnny’s Seeds)

Each two-week interval, half of the transplants were **planted under 50% shade cloth** and half were **planted under Proteknet** insect netting, with a few plants of each cultivar left uncovered as a control.



Proteknet was hypothesized to trap CO₂, resulting in rapid growth and fewer days to harvest.

Thermometers placed under each shade cloth and netting and outside of any covering recorded both the high and low temperatures, which were collected weekly.



Both the **number of heads harvested** and the **weight** were recorded separately for each variety and under each treatment. The total weight was divided by the number of heads harvested.

Data was recorded and processed in Microsoft Office Excel.



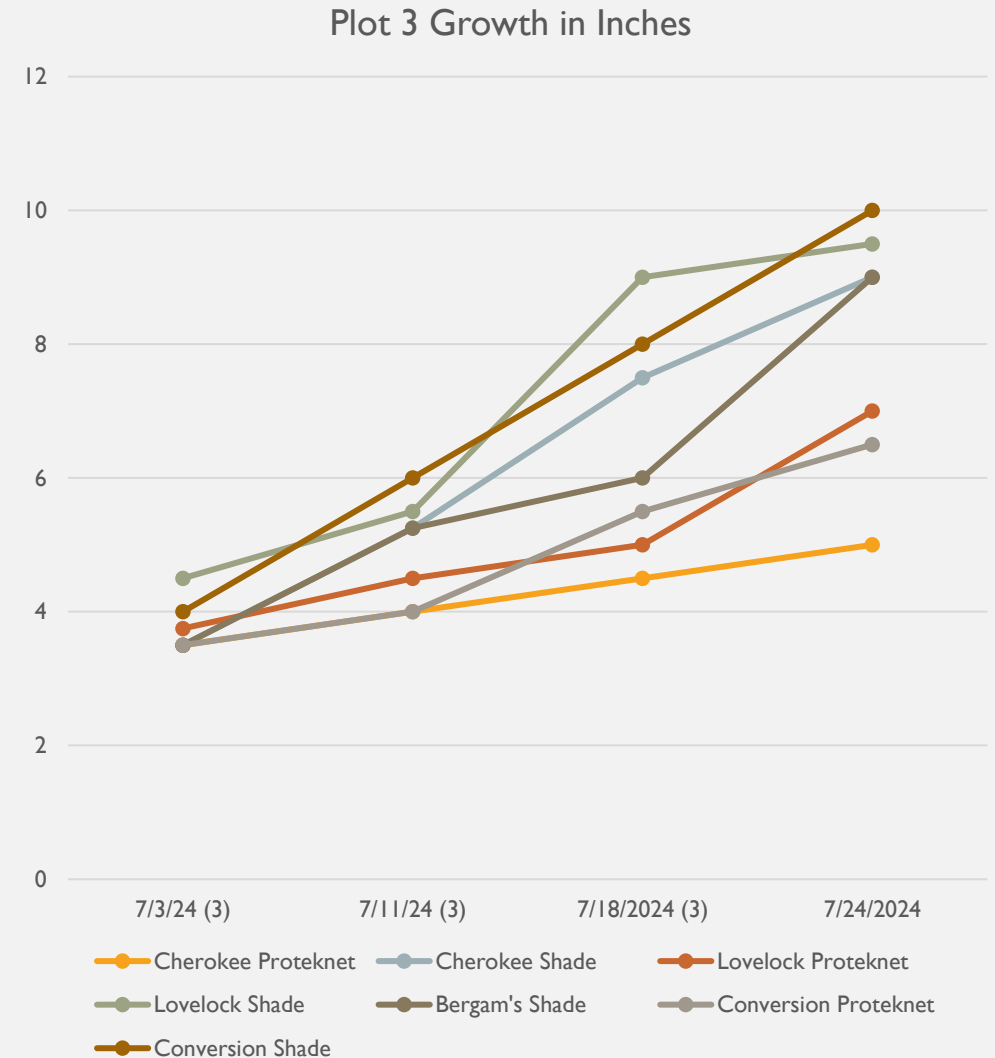
MEASUREMENTS

- Each week, growth measurements were taken using a standard ruler and photographed.
- Germination data from the greenhouse was collected.
- Losses in the field after transplanting were recorded.

RESULTS

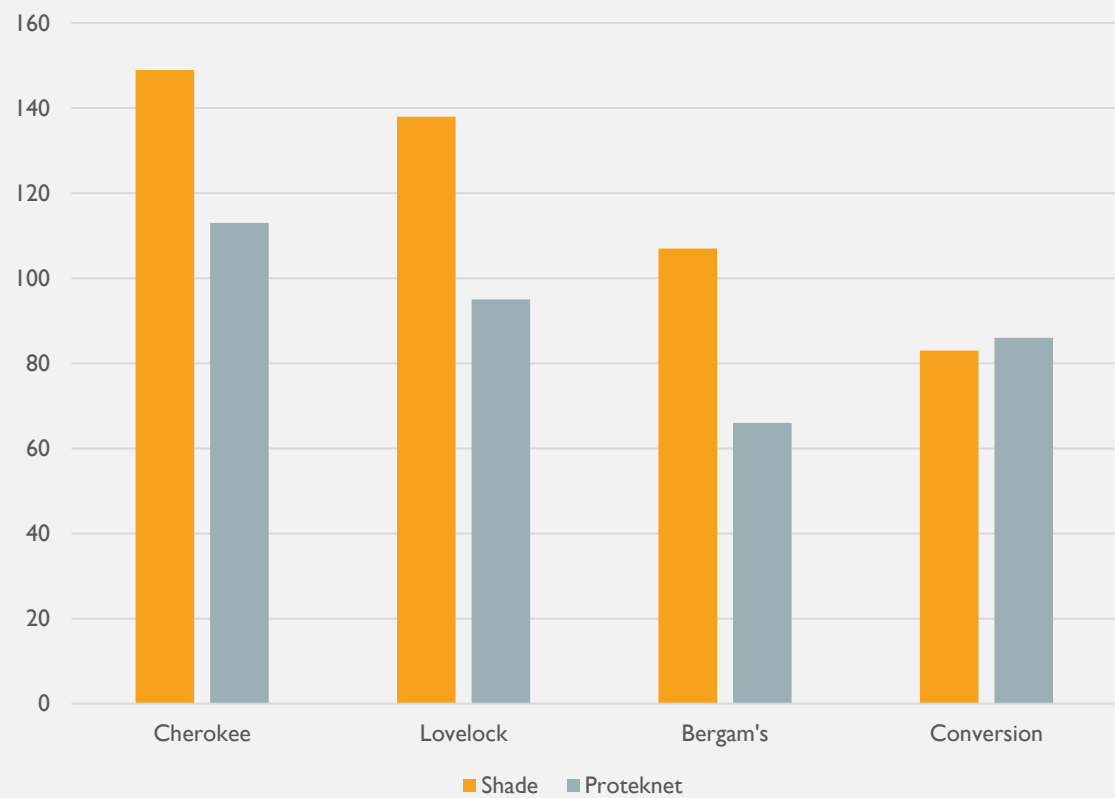
Leaves under the 50% shade cloth grew larger than those under the Proteknet. This could be because the lettuce under the shade was creating more area for gathering sunlight.

Under low solar radiation plants can increase height, yet decrease biomass (Kavga et al, 2018).

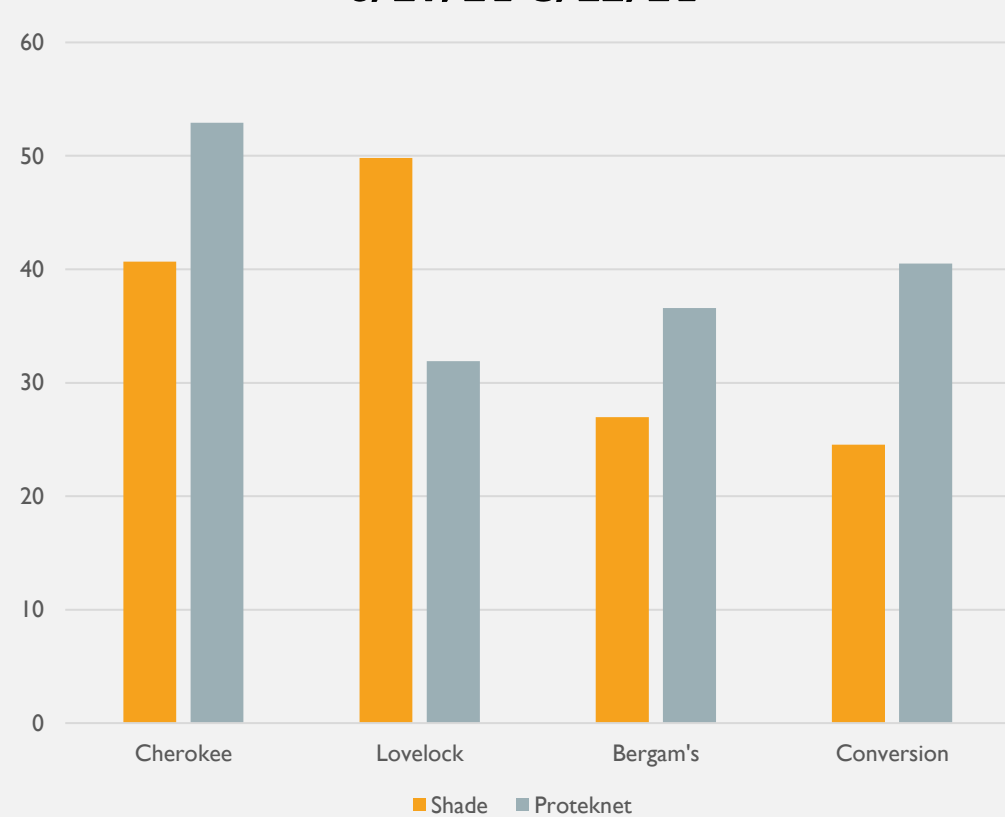


By comparison, under the Proteknet, heads of lettuce generally grew denser but leaves were shorter and tougher. The differences in results in certain cultivars suggests some may benefit more from Proteknet and others from shade cloth. What the market prefers should also be considered (ie. Larger heads or denser ones).

HARVEST BY THE HEAD
6/27/24-8/22/24

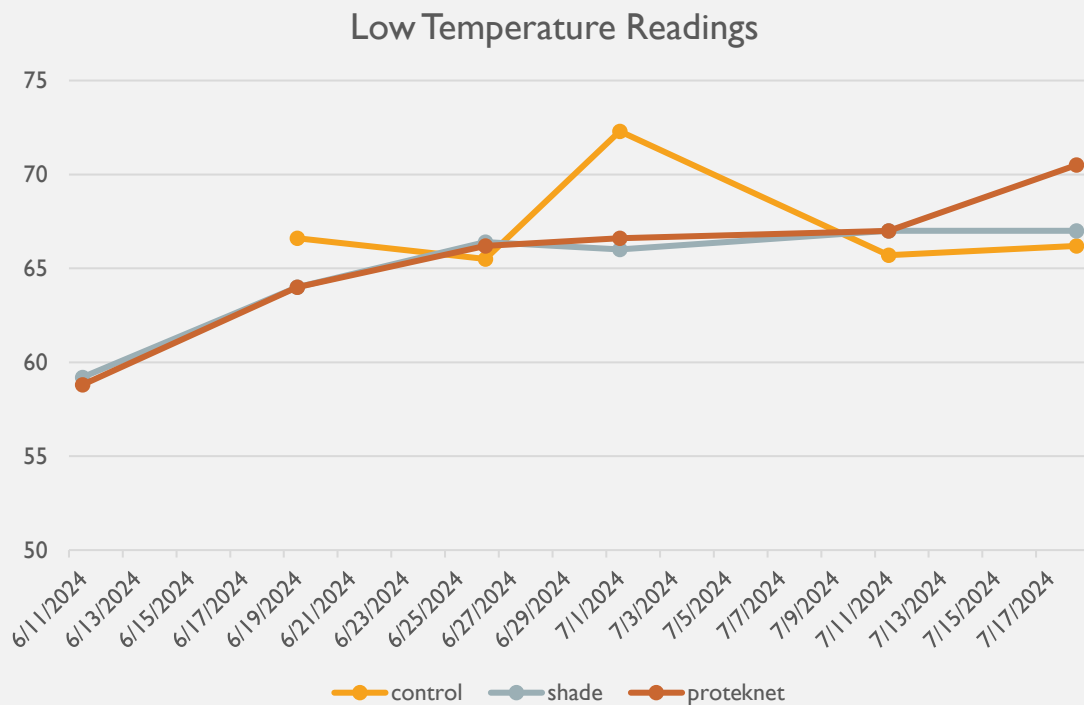


HARVEST BY WEIGHT
6/27/24-8/22/24

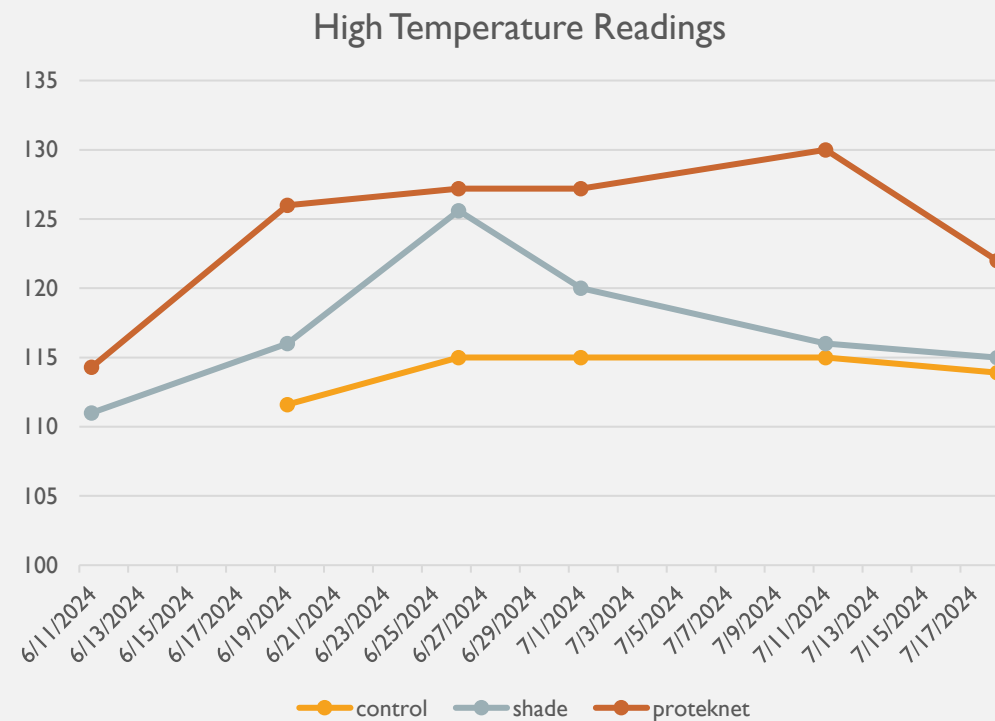


TEMPERATURE READINGS

PROTEKNET TEMPERATURES
GENERALLY HIGHER AT NIGHT
AND DURING THE DAY



SHADE TEMPERATURES DURING
THE DAY REGISTERED HIGHER
THAN THE CONTROL/NO COVER
TEMPERATURES



Maximum temperature
for lettuce germination
is 85°F.

This could also mean
that optimum *growing*
temperature is 75°F,
though it can withstand
higher.

SOIL TEMPERATURE CONDITIONS FOR VEGETABLE SEED
GERMINATION ¹

Vegetable	Minimum (°F)	Optimum Range (°F)	Optimum (°F)	Maximum (°F)
Asparagus	50	60-85	75	95
Bean	60	60-85	80	95
Bean, lima	60	65-85	85	85
Beet	40	50-85	85	95
Cabbage	40	45-95	85	100
Carrot	40	45-85	80	95
Cauliflower	40	45-85	80	100
Celery	40	60-70	70 ²	85 ²
Chard, Swiss	40	50-85	85	95
Corn	50	60-95	95	105
Cucumber	60	60-95	95	105
Eggplant	60	75-90	85	95
Lettuce	35	40-80	75	85
Muskmelon	60	75-95	90	100
Okra	60	70-95	95	105
Onion	35	50-95	75	95
Parsley	40	50-85	75	90
Parsnip	35	50-70	65	85
Pea	40	40-75	75	85
Pepper	60	65-95	85	95
Pumpkin	60	70-90	90	100
Radish	40	45-90	85	95
Spinach	35	45-75	70	85
Squash	60	70-95	95	100
Tomato	50	60-85	85	95
Turnip	40	60-105	85	105
Watermelon	60	70-95	95	105

¹ Compiled by J. F. Harrington, Department of Vegetable Crops, University of California, Davis.

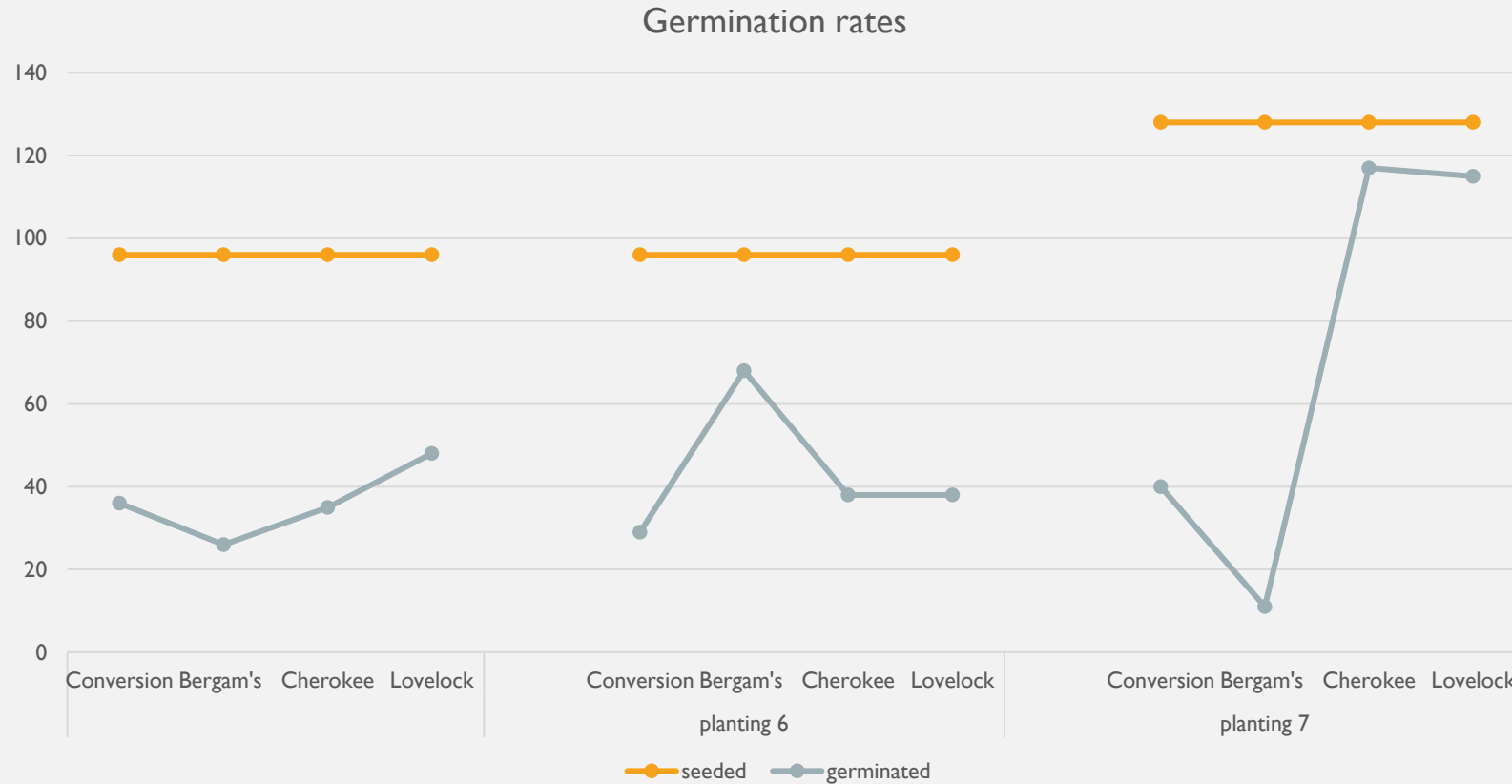
² Daily fluctuation to 60°F or lower at night is essential.

GERMINATION

GERMINATION CONDITIONS VARY BETWEEN CULTIVARS
SOME WANTED TWO DAYS IN THE COOL ROOM, OTHERS THREE
PICTURES TAKEN JULY 21ST



Toward the end of this first year of study, I began to record germination rates and success rates after transplanting.



Planting 5 seeded on June 25th

Planting 7 all seed flats were kept in a 60°F room for 48 hours.

‘Conversion’ and ‘Bergam’s Green’ will be left in the cool room for 72 hours next year.

COOLING

Use of misters or sprinklers,
specifically after transplanting
and heading stages

Pictured here:
Micro-sprinkler from
Greenhouse Megastore



GROWING FOR MARKET

Varieties

‘Cherokee’ and ‘Muir’

Germination

24-48 hours in refrigeration

Cooling

Light misting for 10-15 minutes a few times daily, can be on a timer

Shade

For first 2 weeks after transplanting

SUMMER LETTUCE LESSONS FROM SOUTHERN GROWERS

By Jesse Frost

June 22, 2022

Growing lettuce in the summer is a challenge almost anywhere. The heat stifles growth and kills germination rates. The sun scorches leaves and rapidly wilts the fresh harvest. Summer is just not lettuce's season. But fresh, local lettuce is as in-demand in the summer months as any time of the year, maybe even more so.



The view over (above) and under (below) the shade cloth on Steadfast Farm in Arizona.

JENNY JACK FARM

Varieties:

Muir (likes most of all)

Magenta (pretty good)

Pirat (heat-tolerant butterhead, doesn't handle hottest weather well)

Blue Rock and **Jericho** (romaine cultivars, don't size up or have disease resistance)

30% Shade cloth

Drip + overhead at the very beginning, sometimes multiple times a day, until well established. Overhead only on really hot days after that.

20-foot-long PVC attached to 1/2-inch rebar

Shade attached with PVC clips

\$200-300



JENNY JACK FARM

SMALL MISTERS:
GET THE JOB DONE QUICKER
HARDER TO INSTALL AND REMOVE
CLOG EASILY



TALLER OVERHEAD:
WASTE MORE WATER
EASY TO INSTALL AND REMOVE
USE THIS MORE AND MORE
5-6 STAKES IN THE MIDDLE OF 100-FOOT BED



EXTRA COSTS

- Costs above normal growing costs in spring or fall - this DOES NOT include, labor, seeds, bed prep, irrigation, etc.
- All investments, to be used for many years

- Shade

- | | |
|---|-------|
| • 3 - 7x50 50% shade cloths with grommets | \$488 |
| • 6.9x328 Proteknet | \$289 |
| • Red pins x 300 | \$112 |
| • Standard row cover hoops x 100 | \$156 |

Total

\$1,045

SALES

Often sold out early at the market –
within first hour and a half or two hours

830 heads sold @ \$4/head = **\$3,320**

Income could easily be much higher with
germination and transplant tweaking

Did not come close to satisfying our small
market

Only one CSA distribution, could be every
week

More demand in summer than other times
of year, possibly because there are more
customers at farmer's markets in general



FUTURE RESEARCH

Gather measurements of **solar radiation** and **soil temperature**.

It would be beneficial to conduct a study of summer lettuce production under **differing percentages of shade values**, such as 40%,
as well as **differing colors**, such as white and red.

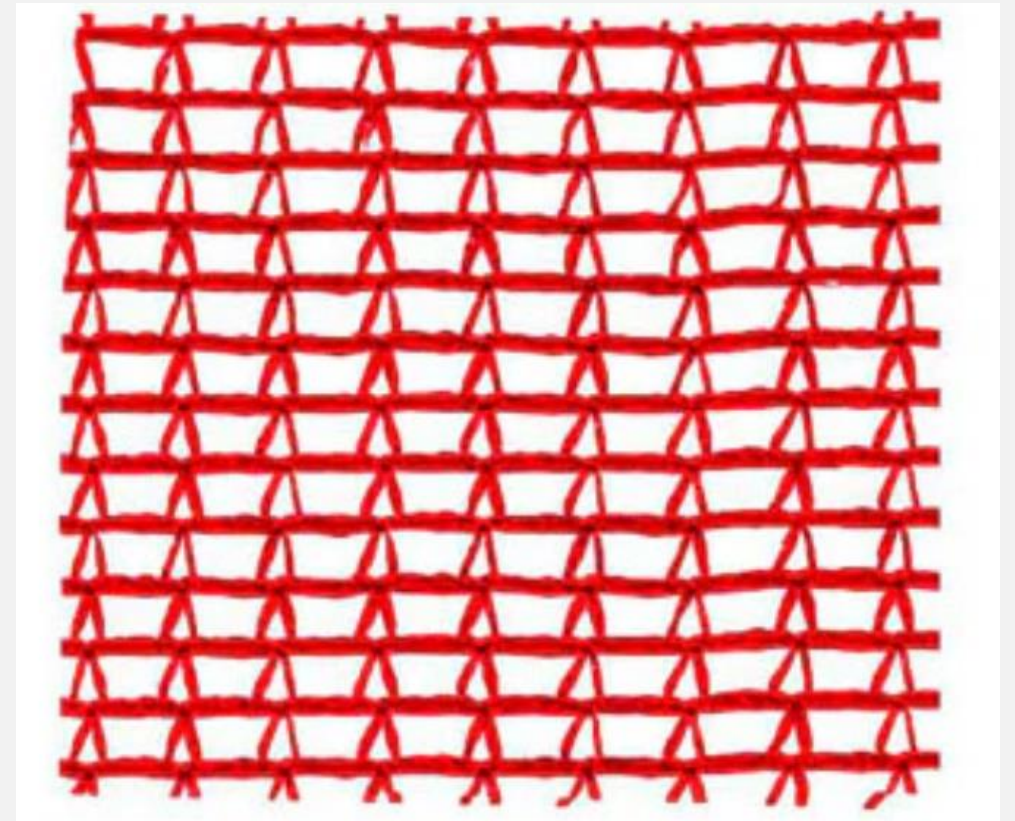
Studies on heat-tolerant lettuce varieties conducted in New Mexico suggest two varieties of romaine lettuce, ‘**Sparx**’ (Johnny’s Seeds) and ‘**Parris Island Cos**’ (Baker Creek Heirloom Seed Co.) could have potential to surpass the varieties trialed here (Joukhadar et al, 2023).

WHITE OR RED SHADE CLOTH

**The albedo effect:
the reflectance of materials**



White shade cloth



Red shade cloth 30%

EXPANSION INTO SHADE RESEARCH COULD INCLUDE LARGER AREAS AND VARIOUS CROPS



COVERING IN ITALY, REPORTEDLY
FOR PREVENTING HAIL DAMAGE



FOR SALE THROUGH A HIGH TUNNEL
COMPANY HERE IN THE UNITED
STATES

SUMMARY

Easy to extend lettuce production into early summer.

Late summer lettuce production requires more time and resources, but can be done.

Must germinate in a cool room for 48-72 hours when above 80 degrees.

Varieties suggested:

‘Cherokee’

‘Muir’

‘Magenta’

‘Lovelock’

‘Bergam’s Green’

FIELD DAY AT SNOW'S BEND FARM

