Announcements:
Native Plant Class starts April 19 at Colorado National Monument
Brown Bag Lunch series to start, plus help with gardens
People like different things, Tastes differ
May or may not save money
Add sprinklers at 30 foot spacing
Some gardens are organic, some are not

Points of Agreement?

• Everyone’s garden is unique
• There is no “best way”
• Huge diversity of opinions/philosophies/tastes
• Size matters when considering options
• Gardening can be time consuming
  – it doesn’t have to be
• Gardening might not save any money
  – but it can
Getting Started

• Good gardens start with good soil
• Soil building is a never-ending process
• Soil tests for new garden sites
  – Nutrient & salt
• Organic matter applications

Spring: best time to apply organic matter

  Horse Manure or Mesa Magic, leaves - pay for themselves over time

Soil testing (salt and pH) important especially for new gardens, can help you decide what
nutrients to add

Incorporate organic matter into soil on a regular basis

Good Soil = Good garden

Need for good drainage

Can reduce to pH of soil over time with annual amendment Ex: Bob’s was >9.0 when he
started
Bob recommends Rainbird Maxipaw but takes out white plastic filters and replaces with 50mesh filters—especially if you are using irrigation water (can vary from near clear to thick, brown).

Can get parts from Western Implements, Ewing—by the case.

Need to babysit to make sure sprinklers don’t get stuck in one spot.

Can get dirty spots on plants with upstream rains—try to limit watering at these times if possible.

System made by Nelson similar, however not interchangeable parts.

Can change height for short-tall plants.
Mesa Magic, horse manure NOT cow or sheep manure—too salty

Our soils are low in Phosphate which is not very water soluble so needs to be deeply worked into soil

Use 18-46-0 fertilizer every few years, disc into soil

Compost, Organic materials- not anything “from a bottle”

Can add sulfur-(30# bags from Palisade Coop) can help lower ph as Sulfer+H2O= sulfuric acid- Bob has been doing this for 10 years

Questioned about use of Biochar: Bob prefers organic materials Biochar more for fruit trees, shrubs, not for vegys

Calcium can help some with blossom end rot in tomatoes
Johnny's Seed Catalogue very useful
- Good seed spacing/depth information
- Some seeds not for direct seeding, will say so
- Videos
- Many disease resistant varieties, good chart

Also Pinetree Seeds, Superseeds.com
Starting seeds – Cold Frames

- Seed starting box works great (once weather warms)
- Start warm season crop seeds 6 weeks before transplanting
- Allows for a greater diversity of variety choices
- Many design options for cold frame.

Warm soil is critical to start seedlings
Full sun and/or soil warmers/warming pad- want soil 60-70 degrees for germination
Use weak solution of fertilizer every time you water
Fertilome better than Miracle Grow (too salty)
Fish emulsion works well-high in nitrogen, but pricey
Fluorescent lights with cool/warm mix to emulate sunlight
Harden off to natural light and outside cold frame box
Can use layer of manure to heat soil
Try soaking seeds to help them germinate faster
From Johnny’s Seed Catalogue
Critical especially if you have the same disease year after year—change variety
Fusarium resistant varieties—especially for Basil (Bob grows 100 different varieties of Basil)
Everybody’s garden is different
Weed control:

Prevention is critical: Apply pre-emergent, incorporate into soil or deep water in, apply carefully as over-applying can cause you problems in the future

Treflan “Trifloralin” (yellow)

Some weeds in pictures: Kosha (seed is red when very small) purple mustard, Red thistle, Lambs quarters (roundup works for this), bristly foxtail

Some people like Milestone- good on rangelands, however not good near vegy gardens- Long half life- can be eaten by animals, then comes out in their manure-can affect tomatoes and peppers-keep them from growing
Walls – of - Water

- Head start for vegetable plants
- Mini greenhouse
- Protect against frost
- Take lots of maintenance
- Inverted tomato cages for support

Bob not a fan
Can work for early planting of warm season vegys: Tomatoes, peppers
Uses upside down, cut off tomato cages to keep upright
Leave on as long as possible, but can still get off without difficulty
Tomatoes like night time temps to be >50 degrees for several nights in a row
Spring planted crops

- frost tolerant, heat phobic
- get them in early
  - frost is not a concern
- get them out before the heat hits
- greens, peas, spinach, cole crops

March 1-April 15
Don’t wait too late as these crops don’t like HEAT- you want them mature before heat hits
Leafy greens, spinach, carrots, onions, peas, radishes, peas- heavy wet snow is good water source for these plants
Need to fall till so beds are ready for early spring planting
Water these crops frequently and more shallowly
Bob waters 3 hours sets 1X a week or every 5 days, cuts back in August-shorter more frequent sets in spring
Early season pests

Chicken wire
Urine sprays
Pellet gun
Lettuce & other Greens

- Huge diversity of types on the market
- Plant early with multiple plantings
- Plant sparsely or thin
- Rabbits
- Aphids & worms in later plantings
- Cutworms

Bob suggests a mix
Suggest multiple plantings
Don’t plant too thickly
Can plant greens at high altitude-deer can be a problem
Flee beetle, like mustard family
Shot type holes in leaves
Spray, but avoid eating sprayed leaves- use contact herbicide
Lots of choices
Not much success with self supporting...most need trellis or fence support
Plant early: first weekend in March, need to mature before heat hits
Trick is keep picking to keep them producing
Can take frost with temps as low as 20 Degrees
Oregon sugar Pod II-large pods
Austrian winter peas
2 suggestions from Master Gardeners:
   Soak seeds in warm water for 24 hours prior to planting
   Inoculate soil with rhizome bacteria, fixes nitrogen-can get small bag from Bookcliff Gardens, a small bag goes a long way
Peas MUST be planted early

Plant as soon as the ground can be worked

Fall till for best results

Late Feb or early March

Self supporting varieties need good stand
Spinach

- Lots of varieties
- Commercial mixes
- Small/large leaf
- Flat/crinkle leaf
- Plant early
- Plantings though April
- Fall planting
- Cutworms (spring)
- Spinach leaf miner
- Root rots

PineTree seeds - a wide variety, mixes
Do several plantings weeks apart
Freezes well

Spinach leaf miner - a little fly with 2-4 generations annually, emerges March/April
Spinach/beet leaf miner: Agromyzidae: *Pegomya betae*
Life History

- Overwinters as pupa in soil
- Emerges late March/April
- Eggs glued to lower surface of leaf
- Up to 70 eggs per female
- Eggs hatch in 3-6 days
- Larvae immediately enter leaf
- 2-4 generations annually
F.L.M. Maggot
Eggs of Spinach Leaf Miner
Bottom line: Spinach will require scouting and possibly sprays. Scout for eggs, spray for adults & newly hatched larvae.

Look how tidy Bob’s rows are!
Management options for spinach leafminer

- Spinach, Swiss chard, beets, other chenopods
  - Lambsquarters, redroot pigweed, others

- Trim off damaged leaves
- 50% loss in my 2012 garden
- Unknown pressure in your garden

- Row covers
- Timing: early/late??

Spray
Trim
Row covers
Will kill tomato plants, need hoops to prevent this
Monitor for eggs-mid-April

Acetamiprid

BugB Gon

Kills Larvae

Watch pre-harvest interval (7 day)

Spinosad-

Need to spray underside of leaf where eggs are
Acetamiprid

- Neonictinoid
- Systemic activity
- Available OTC in several products
- Labeled on many fruits and vegetables
- 7 day phi on leafy greens
- Be sure you have the correct product!

New on market
Absorbed by leaf- gets miners between layers of leave
Bookcliff, Western Implement, Mt Garfield all carry it
Look at small print for active ingredient
Cole crops

- cabbage, cauliflower, broccoli, kohlrabi, and many others
- plant early
- transplants are frost sensitive until rooted
- not heat tolerant
- beat the bugs

Need some frost tolerance
Can use milk jugs to help protect
Non-Traditional Cauliflower

- Orange (Cheddar)
- Purple (Graffiti)
- Green (Vitaverde)
- Romanesco

Plant early to keep heads tight
March planting for best results

Broccoli more heat tolerant
Look for heat tolerant varieties
Brussels Sprouts

Don’t hurry planting or harvest
Plan for harvest through December
Control cabbage aphid
Control cabbage worms if necessary

Harvest around Halloween
Cabbage aphid-Acetamiprid spray
Spring root vegetables

- beets, radishes
- quick germination
- small, multiple plantings
- plant spacing is important
- double crop potential
- root maggots
  - organic matter/timing

One Master Gardener suggestion: Place chunks of potato between turnips in ground to prevent maggots
Timing important
Asparagus

• Perennial
• Max production in 5 years
• Prepare your site well
• Baby the crop for a few years
• Summer growth = spring crop
• Purple Passion
• Insect pests
  – beetles
  – aphids
  – cutworms

Prepare soil well, lots of organic material
Purple Passion- best according to Bob-most vigorous, best tasting
Will produce 20-30 years
Plant crowns 8” deep, spreading crowns out in hole
Fern growth all summer, feeds roots for spring crop
Pre emergent in fall, fertilize (Phosphate) after harvesting
Stop picking when stalks get whimpy
Drip system with light amount of water, but deep-remember crowns are 8” down
Cut down old ferns as close to ground as possible in fall, disc soil
Beetles-Orange with black spots-Lay eggs in berries so because because male varieties don’t have berries- nothing to worry about
Cut worms may cut top of spear
Hard to control- at night with flashlight-hand pick off

Aphids-can hurt the crop, may need to spray if too many-Acetamiprid
Predators may take care of these
Rhubarb

- Spring harvest
- Great high altitude crop
- Baby it through summer
- Pull, don’t cut
- Red & green varieties

Can grow at high altitude
Seed on surface
Rhubarb Red Leaf

*Erwinia rhapontici* (syn. = *Bacterium rhapontici*),

Bacterial disease of rhubarb

Spread by physical movement

Must destroy all infected plants & replant in different area

Leaves turn bright red
Can get earwigs
Garlic

- Hard / soft neck
- Fall plant
- Bacterial / fungal rots
- Seed cloves
- Cure before storage
- Diversity of types

Plant in fall—don’t need fall watering
Oct/Nov
Bob uses hard neck, harvest in July when tops die down
Soft necks later
Like deep watering
Lay in shade to dry, cure— to get a good skin on
No pest problems
Growers set in sun to dry after Sept 15—right angle of sun
<table>
<thead>
<tr>
<th>Hard Neck</th>
<th>Soft Neck</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lots of diversity</td>
<td>Not as much diversity</td>
</tr>
<tr>
<td>Shorter storage</td>
<td>Longer storage</td>
</tr>
<tr>
<td>Bulbils</td>
<td>No bulbils</td>
</tr>
<tr>
<td>Smaller bulbs</td>
<td>Larger bulbs</td>
</tr>
</tbody>
</table>

![Garlic bulbs](image1.png) ![Garlic pantry](image2.png)
Onions

- lots of types
- sets, plants, seed
- plant seed early
- short / long day
- storage varieties for storage
- seeded onions for storage

Plant in spring-fairly early-March
Cure in field in Sept.
Long day varieties work best in North (here)
Short day varieties for more southern areas
Onions

- Long day form bulb when days are 14-16 hours
- Short day form bulb when days are 12-14 hours
- Maximize growth before bulbs set
Onion Pest Management in the Garden

- Soil borne diseases
- Thrips?
- Rotate from year to year
- Harvest after tops fall
- Cure until skin is set
- Store cool and dry
- Plant storage varieties if you want long storage

Thrips- smaller onions
Rotate to various places in garden
Pelleted seed

- seed coating
- makes handling/planting easier
- not necessarily any pesticides in pelleted seed
- several seed catalogs offer pelleted seed
- carrots, onion, basil

Makes seeds easier to handle-bigger
Are organic pelleted seeds available
Onion – Seed, Sets, Plants

- Seeds very early, plants early, sets after frost
- Use young plants (any type) for scallions
- Seeds for storage onions
- Large sets for scallions
- Small sets for storage bulbs
- Lots of varieties & types

Sets are small onion bulbs
Plant in mid April
Good for harvesting green onions
Don’t store very long
Store in cool, dark, high humidity places with good air circulation
Can use grocery store varieties
Shallots from Seed ‘Ambition’

- Shallots & shallot sets are expensive
- Shallots are easy from seed
- Large, 5-6 bulbs per plant
- Long storage
- Pungent

Ambition-good shallot variety
Can seed in March, harvest in Aug
Seeds most affordable
Use San Louis Valley potatoes are the best, Yukon Golds are good
Don’t use grocery store varieties- need seed potatoes
Grocery store ones are sprayed to prevent sprouting
Use new seed every year
Can dig all season long starting with new potatoes

The Potato Patch in Eckert-organic seed potatoes
Place a line of seeds on the soil, keep adding more soil as sprouts come up
Bob not a fan of fingerling potatoes
Bigger seed potatoes can be cut into 3-4 eyes, let callous over
Seeds take a long time to germinate
Put a thin layer of grassy mulch on top to keep seed moist
Do a late planting for sweet fall crop
Leave a few in the ground, let flowers drop back—gorgeous, butterflies will like
Suggestion: plant carrots and radishes in same row-by harvesting radishes, thin carrots
Warm season vegetables

• Solanaceous fruiting vegies
  – tomato, pepper, eggplant
• Cucurbits
  – melon, squash, cucumbers
• Night time temps above 50°
• No frost tolerance
• Transplants or seeded

Night time temps above 50°-critical!
Summer Squash

- Zucchini, yellow, crookneck, pattypan
- Harvest while immature
- Soft rind
- Short storage
- Plant when soils warm
- Transplant into protection for early crop
- 3 ft spacing between plants

Can start indoors
Can use walls of water to plant earlier
2-3 plants per hill
Eight Ball-good one for stuffing
Winter Squash

- Many types
- Long storage
- Wait until June to plant
- Most take lots of room
  - Don’t overplant
- Allow to mature on vine
- Control squash bugs
- No vine borer in western CO

Waltham Butternut-good flavor
Gourds

Lots of types
Large, small
Colorful or not
Curing time & effort
Crafting
Large gourds need
110+ days

Squash bugs

Be careful about cross pollination-can happen!
Great for crafts
Squash bees

- Native pollinators
- Squash specialists
- Early morning
- Maintain crop from year to year

Squash specific bees-only feed/pollinate squash
Best planted in June
Be sure and clean up/discard vegetation to help make it so only adults over winter
Overwintering as adults

Mild winter temperatures allow more squash bug to survive

Outdoor clutter favors squash bugs

Found bugs overwintering in base of Yucca
If you see eggs, you are too late!
Nymphs: if you see them, you are too late
Key is starting early
Will even grow under black fabric
Start Early & Take Advantage of Behavior

The target should be they adult squash bugs as the first move on to the plants

Invading bugs congregate & take cover at the base of plants

This is where insecticide placement should be

This does not work if you were delinquent with item #1

Bob suggests using watering can to be sure and get good placement
Squash Bug Control (continued)

- If they got way from you and there are lots of nymphs:
- You are going to have to spray the underside of the leaves
- Prepare yourself mentally to admit defeat...

To get nymphs—have to spry underside of leaf—difficult
If your squash looks like this, plan on doing a better job next year.
Mulches are not a good idea where squash bug is a problem.
This is not good

Bugs on a pumpkin
Squash bug alternative

If you have tried & failed at controlling squash bugs, but want to try one more time

Plant no squash other than Waltham butternut

Apply controls as specified
Insecticides for squash bug control

• The best insecticide is not effective if the program begins too late

• Spraying the top of the leaf does not kill a bug on the underside

• There are no good organic insecticides
  • “they were wading belly deep in diatomaceous earth”

• Pyrethroids (permethrin, esfenvalerate)
• Sevin
My program

• Plant zucchini early, harvest a couple times
  • don’t treat until it is too late to salvage
  • nuke the bugs, then tear out zucchini

• Plant winter squash late (early June)
  • Treat weekly for 3-4 weeks after first true leaves emerge

  • Pyrethroids applied with a watering can
  • Voliam Express (only available commercially)

Apply with watering can
Squash bugs usually don’t harm melon plants/melons
Voliam Express – Rynyxpyr
Tomatoes

- lots of diversity
- heirloom / conventional
- indeterminate / determinate
- slicers / paste
- early / late
Heirloom Tomatoes

• Flavor diversity
• Color / shape diversity
• Indeterminate (mostly)
• Open pollinated (all)
• Soft texture (many)
• Short shelf life (many)
• Limited disease resistance
• Large plants (often)
• Unpredictable performance

Unpredictable performance
Soften quickly
Can rot on plant
Large plants, but less fruit
Only indeterminate-
Tomato Culture

- warm nights
- plant spacing by variety
- direct seeding possible
- massive root system
- let them dry out
- not too much N

Want weather prediction to beat least 10 nights of over 50 degrees. Shady Lady, Mtn.
Fresh-good varieties - Valley Grown Nursery, Okagowa
Don’t over water in growing stage-let them dry out some
Determinate-Harvest over time
Indeterminate- come all at once- good for canners!

Tomatoes plants need very little Nitrogen- too much means large green plants, but little fruit!
Fertilize with phosphate: 18-46-0 is good
Tomato Pests

- Hornworms
- Leafhopper/Curly Top
- Early blight
- Anthracnose
- Fusarium

Hornworms- hand pick them off-don’t spray for them
Tomato transplants

- Widely available (when you want to plant?)
- Widely variable
- Are the varieties you want available?
- Are they diseased?
- Are they too big or too small?
2005 was problem year
Can call Los Cruces, NM to see if problem is headed our way
Row covers recommended
Acetimiprid can reduce
Whole plant turns yellow

Tomato
- Whole plant symptom expression
- Color change
- Leaf roll
- Leathery texture
- Purple veins
Peppers
Lots of other viruses
Shortened internodes
Severe stunting
Whole plant yellowing
Rosetting of upper plant
Usually on scattered plants
Virus in pumpkins

Pumpkin
Scattered plants
Whole plant yellowing
No distortion of growth
Kabocha squash

Symptoms similar to pumpkin

Plant loss leading to sunscald of adjacent fruit a problem
Dry bean

Occasional plants
Whole plant yellowing
Beet leaf hoppers - spread from Curly Top Virus in Tomatoes - an indicator
BCTV in Spinach

- Problem in winter planted spinach in AZ
- Sep – Oct planted spinach most susceptible
- No known resistant varieties
BCT Weed Hosts in New Mexico
Creamer, R, J. Carpenter & J. Rascon. 2003. Incidence of the beet leafhopper in New Mexico Chile. Southwestern Entomologist. 28(3) 177-182

<table>
<thead>
<tr>
<th>Species</th>
<th>Infection Rate (# tested)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2001 (high BCT)</td>
</tr>
<tr>
<td>Pigweed</td>
<td>0.84% (237)</td>
</tr>
<tr>
<td>London Rocket</td>
<td>1.74% (115)</td>
</tr>
<tr>
<td>Lambsquarters</td>
<td>3.51% (57)</td>
</tr>
<tr>
<td>Kochia</td>
<td>16.67% (18)</td>
</tr>
</tbody>
</table>
Some AZ BCTV Host Plants

London rocket  Alfalfa (Yellow-flowered)

Redroot pigweed  Lambsquarters

These host plants are symptomless when infected!
Beet Leafhopper
*Circulifer tenellus*

- Green (other forms exist)
- Slightly roof shaped face
- No spots

- Lots of similar species!
- Check chenopods
  - Kochia
  - Greasewood
  - 4-wing saltbush
Leafhopper Transmission of BCTV

- Beet leafhopper is only known vector
- BLH has extensive host range from many different families
- Transmission most efficient after 48 hr acquisition feeding on infected source plant
- 2-20 minute acquisition feeding can result in lower transmission efficiency
- Virus does not replicate within leafhopper
- 4 hr latent period required
- Healthy plant can be infected by 1 minute feeding by vector
- BLH retains ability to transmit for days to weeks

Beet leaf hoppers will come in with storm fronts
Probing the plant can also transmit the virus
Tomato Planting Date Effects on BCT
2007, Western Colorado Research Center @ Orchard Mesa

3 Planting dates
25 Apr, 9 May, 23 May

Moderate BCT pressure

Low % BCT in early PD
~ 8-12% in later planting dates

Not consistent with other research
Acts like aluminum foil
Confuses virus because of reflection
Progression of BCT Infection, 2012
Arrows are dinotefuran application dates

% BCT Infected Plants (Cumulative)


Foliar
Soil
Untreated
2012 Tomato BCT Control with Dinotefuran

![Graph showing the percentage of infected plants under different conditions.](image)

- **Foliar**
- **Soil**
- **Untreated**

#### Shady Lady
- a
- b

#### Monica
- c
- a

Note: The graph indicates the percentage of infected plants under foliar, soil, and untreated conditions for two varieties, Shady Lady and Monica.
Management Options for Tomato Growers
Goal is to minimize losses

Commercial growers
- Hybrid varieties
  - better than heirlooms
- Early / late planting
- Hoop house protection
- Soil applied systemics
  - dinofuran
  - imidacloprid
- Reflective mulch
  - drip irrigation only

Home gardeners
- Avoid or protect heirlooms
- Early / late planting
- Floating row cover protection
- Foliar systemics
  - acetamiprid
- Reflective mulch?

Protect heirlooms with floating row covers
Peppers

- Peppers like heat
- soils & air temp
- Find your variety
- Lots of diversity
- Plant close to prevent sunburn
- Nitrogen after fruit set

Plant around May 1—they love heat
Plant close—every 9” stagger—help protect from sunburn
No Nitrogen until fruit has set, then Nitrogen
Do well with transplanting
Pepper varieties

• Chile aka Anaheim
  – Big Jim, Sahuarao (Biggie chile), Joe E Parker, Barker, College 64

• Poblano
  – Ancho, Tiburon

• Bell
  – Gourmet, Flavorburst (Orange)
  – Ace, California Wonder (Red)

• Jalapeno
  – Mucho nacho, Mucho grande

Big Jim-Big yield
Gourmet Bells- Bob’s favorite- good flavor
Okagawa has lots of varieties
Tiburon Paplano-excellent, nice, thin skinned
May have some cross polination if plant bells and hot peppers close together
Eggplant

- Grown much the same as peppers
- Lots of types
  - Bell, cylindrical, long, round
- Lots of colors
  - Dark & light purple, black, white, green, striped

Flea beatles like them when they are small- treat early
Can get spider mites
Cucumbers

- Slicer or pickler?
- Vine or compact
- Long or short?
- Male & female flowers
- Pollinator needed
- One hill makes a lot of cucumbers
- Keep them picked

Slicers-few a day
Picklers-you want lots all at once
Plant 3-4 plants per hill
Some male, some female-want some of each per hill
English and Armenian-good eaters, don’t store as well
Diva-bitter taste
More traditional, small, compact do best
Melons
Like heat and space
Plant around My 15
Bob’s favorite is Charantais from Lake Valley Seed-smooth skinned, salmon colored, often bursts due to short shelf life, but worth it!
Need to check garden daily
Pick when color changes
Melons can attract fruit flies if left in garden
Watermelon

- Lots of types
  - What do you do with a 150# melon?
- Give them room
- Shorter season than you think
- Hard to judge maturity

Direct seed
Green Beans

- Pole beans or bush beans
  - Pole beans save room
- Determinate or indeterminate
- They like warm soils
- Plan on 3 picks a week
- Mexican bean beetle some years
- Don’t overwater!

Likes warm soil
Don’t overwater
Dry Beans

- Incredible diversity
- Plant in June
- Cleaning?
- Crafting uses
- Soup mixes
- Nuo popping beans

Calypso

Fun, interesting but a lot of work to pick, shell, dry
Sweet Corn

- open pollinated or hybrid
- su – sugary
- se sugary enhanced (heterozygous)
- se+ - sugary enhances homozygous
- sh2 - super sweet, sugary shrunken
- Synergistic – 75% se & 25% sh2
- Yellow, white, bicolor
- GMO, or not?

Be sure and know what type you are planting and know what it requires
Olathe Sweet Corn is not GMO!!!
Growing sweet corn in the garden

- Plant in blocks
- Isolation
  - physical, temporal
- Warm soils
- Corn earworm
Dry, field, pop, ornamental corns

- Lots of open pollinated types available
- Water & fertility
- CEW will be present
- Harvest & cleaning
- Save seed

CWE-Corn Worm Ears
More Questions?

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