NEM 204: NEMATODE FIELD TRIALS
What do you want to test (hypothesis)?

- Nematodes/hosts,
- Chemicals,
- Soil amendments,
- Cover crops,
- Resistant varieties,
- Damage/economic threshold,
- Sampling procedures,
- Population changes over time,
- Hot water or other planting stock treatments,
- Genetic variability
WHAT IS A FIELD?

LATHHOUSE / GREENHOUSE / GROWTH CHAMBER
Where do you want to work?

Microplot/Mesocosm,
University field station,
Private field station,
Grower's field.

Who are your cooperators?

Farm Advisors,
PCA's,
Growers,
Industry representatives
Field station staff.
Before you start, establish presence of nematode population
(don't take anyone’s word for it).
"Natural" vs "recently" introduced populations.
What problems are present besides nematodes.
Is the population too high or the problem too bad to correct?
MICROPLOTS / MESOCOSM

Auburn, AL

UCDavis
UNIVERSITY FIELD STATION

South Coast Research and Extension Center
TWO CARROT TRIALS IN GROWER’S FIELD

Kern County
HAND PLANTING
EASTER LILY
BULBLETS
8 BULBLETS PER FOOT OF ROW
UC Policy Communication 18,
CAL-EPA Research Authorizations
Good Laboratory Practice (GLP) for residue trials
Do as much beforehand as possible
But expect to make changes in the field.
Don't be afraid to make decisions.

Make a list
Don't forget the duct tape or the water.
Take extra of everything.

Preliminary plot map,
Rate calculations,
Pre-measuring of materials,
Label plot stakes,
Label flags,
Make labels for samples.
Transportation to the field

Take 2 vehicles if possible
(or 1 vehicle and a cellular phone).

Where are the car keys?

If not on a paved road, consider backing in.

Park away from areas used by farm equipment.
Things to record or collect
plot name, location,
plot map, which way is north,
persons present,
getting back to the same location,
host, nematodes,
number of treatments,
experimental design,
plot size (length and width of each replicate),
crop row width, number of replicates,
soil sample (for soil type, % organic matter, pH, etc.),
soil temperature,
% soil moisture (important for fumigation treatments),
general weather conditions, type of irrigation, fertilizer,
weed and pest control, application dates,
rate calculations,
methods of application and incorporation,
planting date, harvest date,
closest CIMIS or other weather station
previous cropping history, previous nematicide use.
MINIMUM CRITERIA NEEDED TO BE ABLE TO EVALUATE AN EFFICACY TRIAL:
GENUS OF NEMATODE
UNTREATED CONTROL
ESTABLISH PRESENCE OF NEMATODES PRIOR TO TRIAL
COMMON NAME OF TEST PLANT
MINIMUM OF THREE REPLICATES
RANDOMIZED DESIGN
NEMATODE COUNT AT LEAST 6 WEEKS AFTER PLANTING
STATISTICAL ANALYSIS OF RESULTS
OBSERVATIONS ON PHYTOTOXICITY
Applying treatments
   Assign one person (two is better)
   to guide applicators to plots to be treated.
For chemicals record
   type of formulation,
   names and amounts of active ingredients,
   lot number, date received,
   amount of water or other material used to
   dilute product,
   band width,
   depth of application,
   shank spacing,
   time between application and incorporation,
   application rate,
   rate calculations.
Don't assume a biological or natural product is safe, use same precautions as when applying chemicals. Don’t assume a chemical is as safe as its current label indicates. Work upwind of products being applied.
Liquids
  hand injection gun,
  hand sprayers,
  drench (sprinkler can),
  soil vs foliar applications,
  calibration.
Granules, powders.
Methods of incorporating liquids,
  granules and powders.
Application in irrigation water,
  flood, basin, furrow, sprinkler, drip.
Location of established irrigation systems.
Recontamination of treated areas.
IN FURROW APPLICATION OF BIOLOGICAL NEMATICIDE
CARROT TRIAL IN GROWER’S FIELD
FUMIGANT APPLICATION VIA DRIP TUBE
EXPECT THE WEATHER TO BE BAD
IT WILL PROBABLY BE EVEN WORSE THE NEXT DAY
SAFETY: DON’T EXPECT THE EQUIPMENT OPERATOR TO SEE YOU.
Safety

Never assume an equipment operator can see you or hear you.

For chemical trials

gloves, Tyvek suits, rubber boots, respirator, cleaning up.

Accidents - where's the nearest telephone/hospital?

Shade

Water
IT ALWAYS TAKES LONGER THAN YOU THINK IT WILL

WHAT ABOUT LUNCH?
SOIL SAMPLES

One day sampling could = 8 Weeks processing/counting
Nematode Samples (the greatest cost in a trial):
Consider -
number of subsamples per sample,
sampling method,
depth,
extration method,
storage time and temperature.

Pretreatment
PI, from every plot
vs from untreated checks
vs from each block, etc.
Posttreatment but preplant (depends on initial population).
Postplant (depends on expected rate of change of nematode population).

Harvest
  Pf,
  grading nematode damage to crop quality above or belowground,
  root-gall ratings (no best method, record what you do).
TAKING SOIL SAMPLES MID-SEASON
BIOINDICATORS:
WORMS, CITRUS NEMATODE, INSECTS, SEEDS

REDWORM BOTTLES
CITRUS NEMATODE BAGS
BURRYING CITRUS NEMATODE BIOINDICATORS
LOST DATA POINTS
RED WORM BIOINDICATORS
WEED TAPES / GRASS SEED INDICATORS
UNTREATED

METHYL BROMIDE
Plot designs.

There is no single correct way or best way to do an experiment.

Plot size for nematode evaluation vs plot size for crop yield evaluation.

Statistical analysis programs (SAS, JMP).
FIELD TESTING:
UNTREATED AREAS
REPLICATION
RANDOMIZATION
CHEMICAL STANDARD
BIOFUMIGATION:
EVALUATION OF BROCCOLI RESIDUE FOR
SUGARBEET CYST NEMATODE (SBCN) CONTROL
BROCCOLI IS A HOST FOR SBCN
BRASSICACEAE PRODUCE GLUCOSINOLATES
BROCCOLI DEGRADATION RELEASES
ISOTHIOCYANATES
WHY IS SBCN A PROBLEM ON BROCCOLI?
TREATMENTS:
TELONE II 1X (9 GPA)
TELONE II 2X (18 GPA)
1X BROCCOLI
2X BROCCOLI
NONE
TARP
COMBINATIONS
RCB
4 REPS

2 WEEKS TOTAL
BETWEEN CROPS
BROCCOLI MOWED AND CHOPPED

FIELD TILLED, BEDDED, AND TARPED
2000 - YIELD INCREASES WITH BIOFUMIGATION

NUMBER OF MARKETABLE CROWNS

1XTELONE2X
1XTELONE
1XTARP
1X
2X
NONE

ERROR BARS INDICATE 1 STANDARD ERROR
2000 - NEMATODE REDUCTION WITH BIOFUMIGATION

2000 SCFS BROCCOLI BIOFUMIGATION TRIAL

ERROR BARS INDICATE 1 STANDARD ERROR

EGG HATCH PF/PI

0.0 0.2 0.4 0.6 0.8 1.0 1.2 1.4 1.6 1.8 2.0

1XTELONE2X
1XTELONE
1XTARP
1X
2X
NONE

2000 - NEMATODE REDUCTION WITH BIOFUMIGATION
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</tr>
<tr>
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<tr>
<td>3</td>
<td>DITERA DF</td>
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<tr>
<td>4</td>
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<td>8</td>
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</tr>
<tr>
<td>9</td>
<td>FORE</td>
</tr>
<tr>
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<td>FOSTHIAZATE</td>
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Crop Samples
Standcount
Phytotoxicity
Midseason assessments

Harvest
hand harvest
semicommercial with experimental sized equipment
combination of experimental and grower equipment

Interactions of treatments with other pathogens. Effects of treatments on nontarget organisms. Potential for nematode treatments to affect other pathogens.
MELON TRIAL - TREATMENTS OVERGROWING EACH OTHER
ROOT GALL RATING
HAND HARVESTING GRAPES
MECHANICAL HARVESTING OF PRUNES
MECHANICAL HARVESTING OF PRUNES
MECHANICAL HARVESTING OF PRUNES
MECHANICAL HARVESTING OF PRUNES
MECHANICAL HARVESTING OF PRUNES
DON’T FORGET THE DUCT TAPE