Influence of Cover Crops on Organic Dry Bean Production Systems

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MICHIGAN IS #1 ORGANIC DRY BEAN PRODUCER

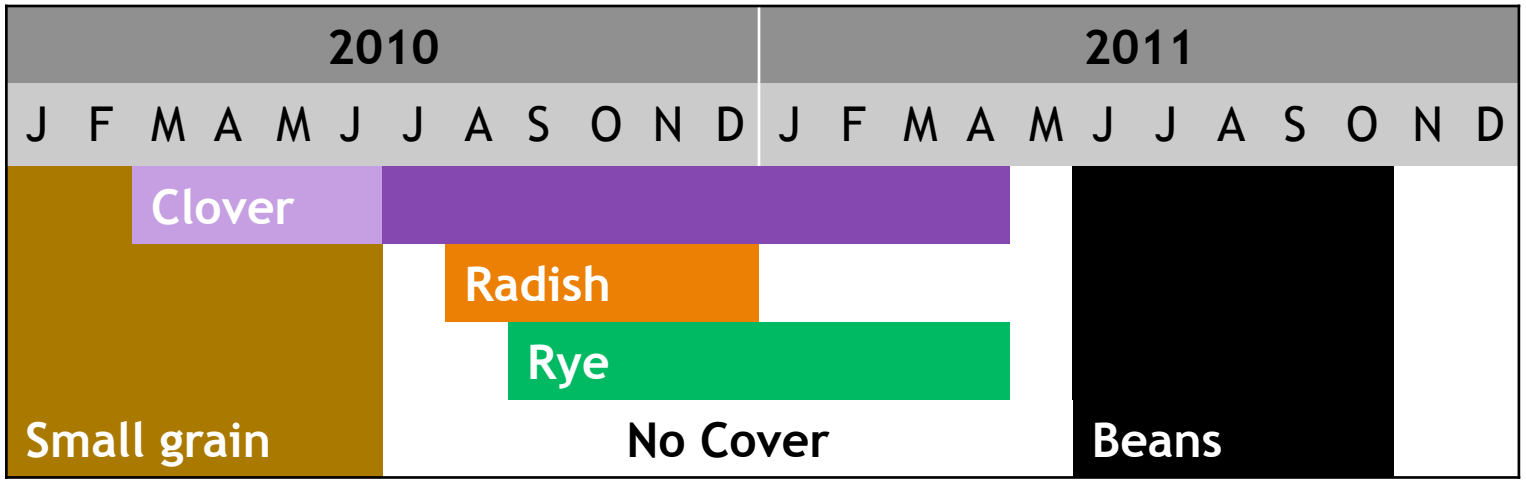
- Black beans #1 class produced
- Need to maximize
  - Weed control
  - Nutrient availability
  - Yields
- Cover crops could play an important role fufilling these needs

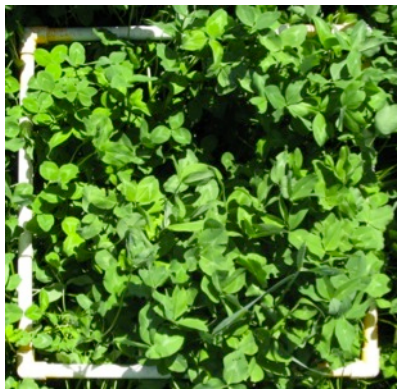
IMPACT OF COVER CROPS ON ORGANIC DRY BEANS

- Locations
  - ★ Kellogg Biological Station (Hickory Corners, MI)
  - ★ MSU Student Organic Farm (East Lansing, MI)

- Split plot design
  - Main plot= Cover crop (4)
  - Sub-plot= Bean variety (4)

IMPACT OF COVER CROPS ON ORGANIC DRY BEANS





Red clover
'Marathon'
11 kg/ha

Oilseed radish
'Groundhog'
12 kg/ha

Rye
'Wheeler'
100-125 kg/ha

No cover

DRY BEAN VARIETIES

Black-
'Zorro' & 'Black Velvet'

Navy-
'Vista' and R99 (no-nod)

Measuring Cover Crop Impact

- Weed biomass
  - After tined weeding and rotary hoeing (V2)
  - After cultivation was complete (R5)

- Nitrogen availability
  - Soil samples (Fall, @ planting, V2, R1, R5, Harvest)
  - Ion exchange resin strips (changed every 2 weeks)
  - Chlorophyll content (V2, R1, R5)
  - Seed nitrogen content

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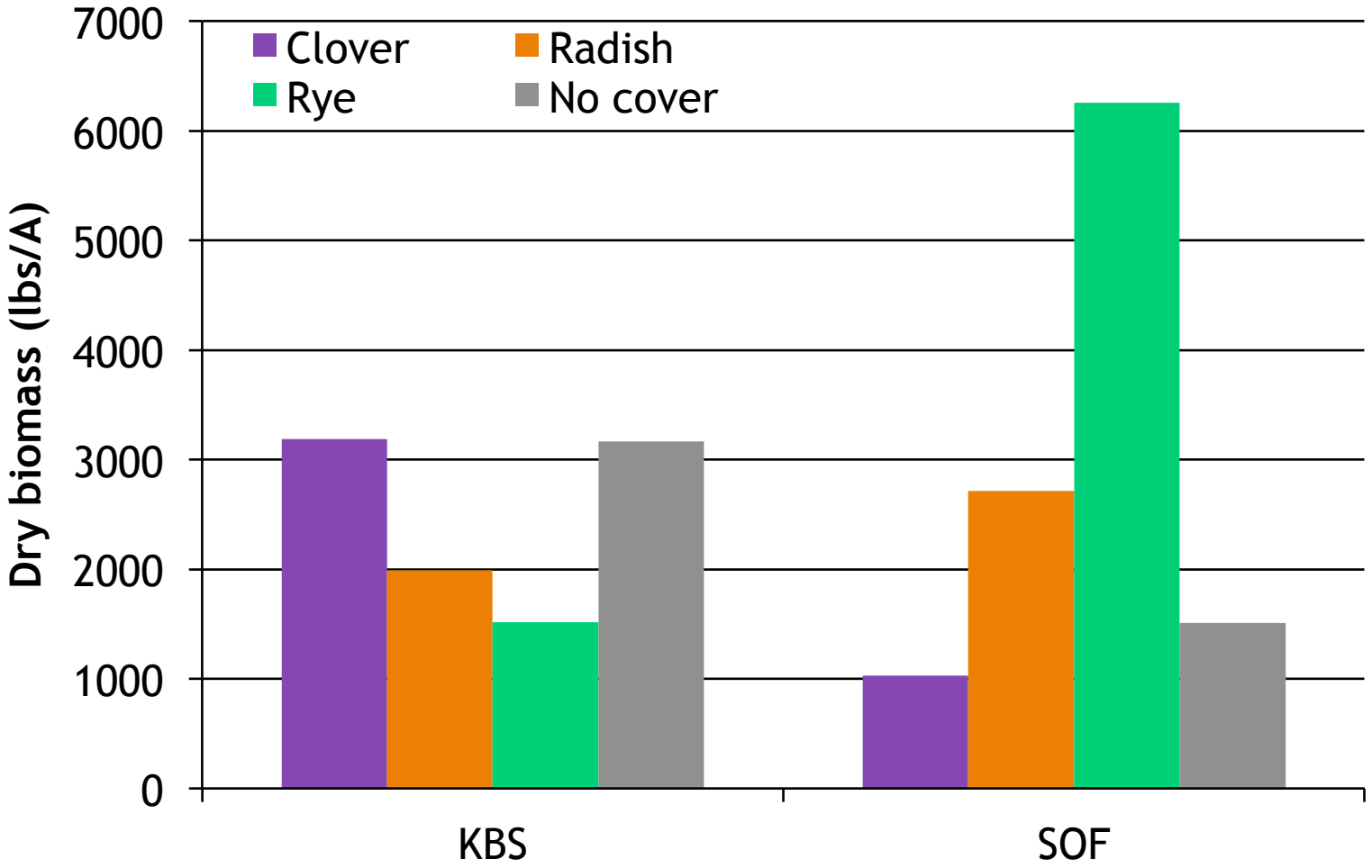
  - Seed nitrogen content
- Bean populations (V2 & Harvest) and yields

Peak Cover Crop Biomass



KBS > 3,000 LBS/A

SOF > 1,000 LBS/A

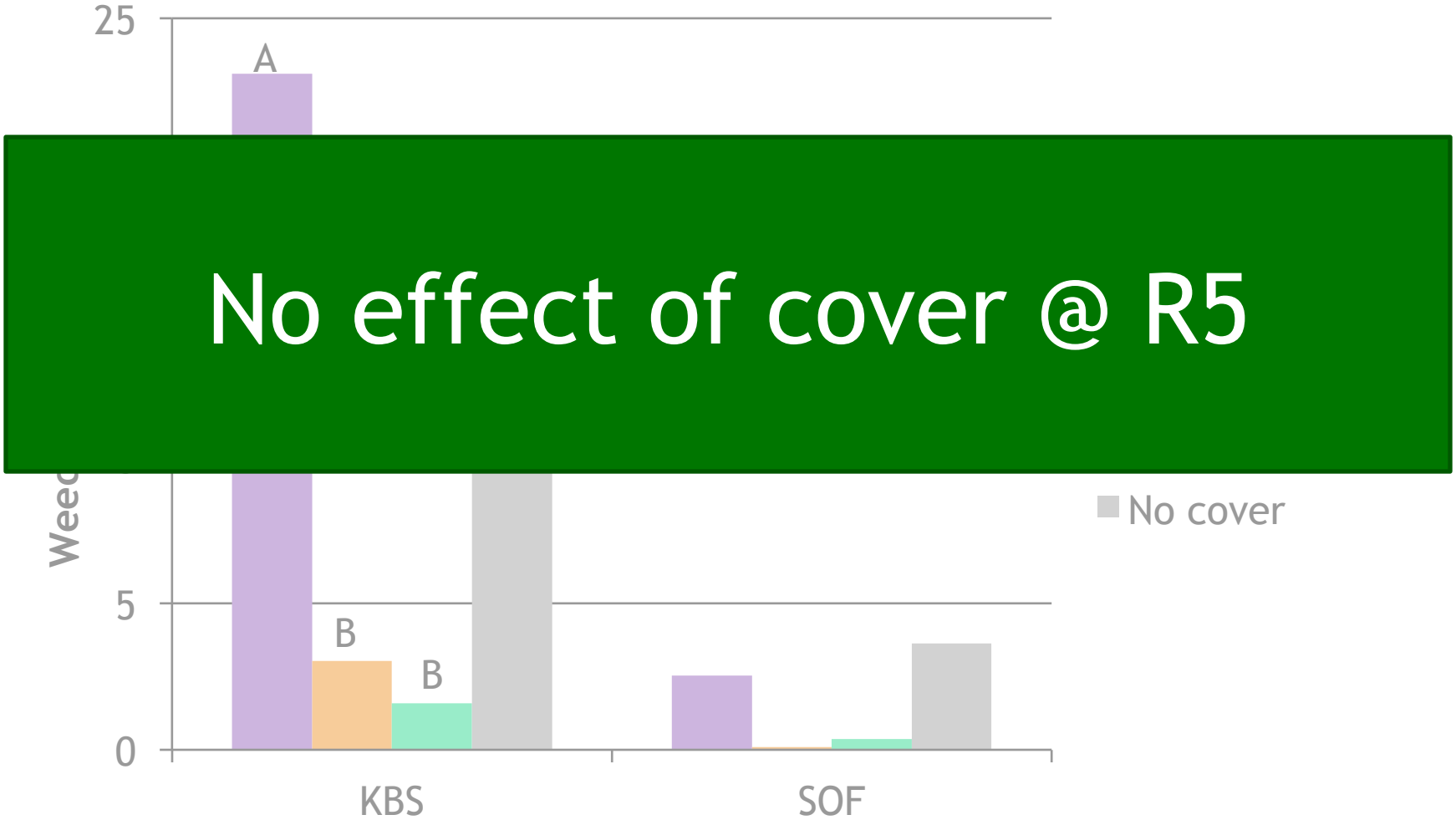
KBS > 1,500 LBS/A

SOF > 6,000 LBS/A

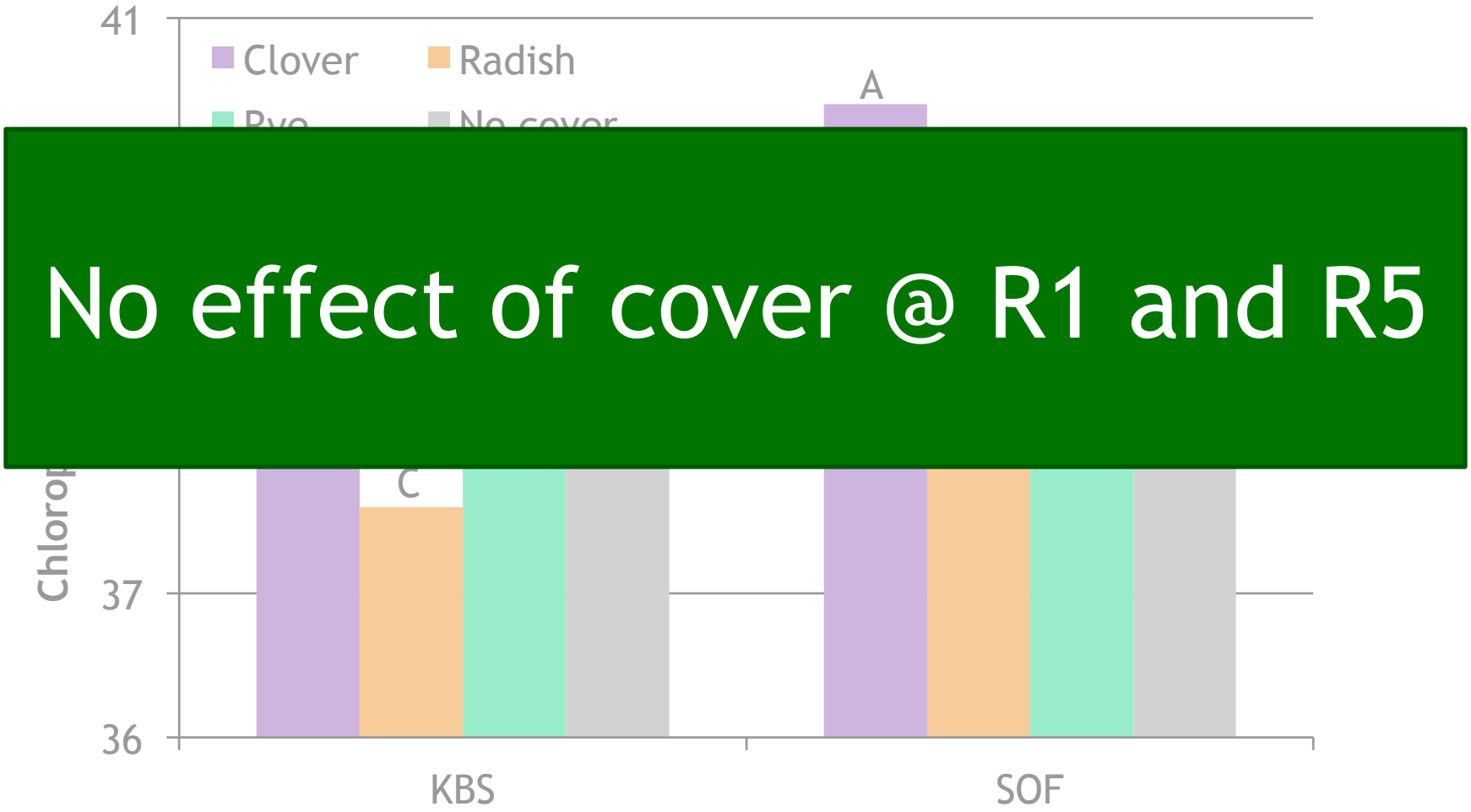
Bean varieties

- Did not respond differently to cover crop treatments
- Combined for analysis

Weed Dry Biomass (V2)

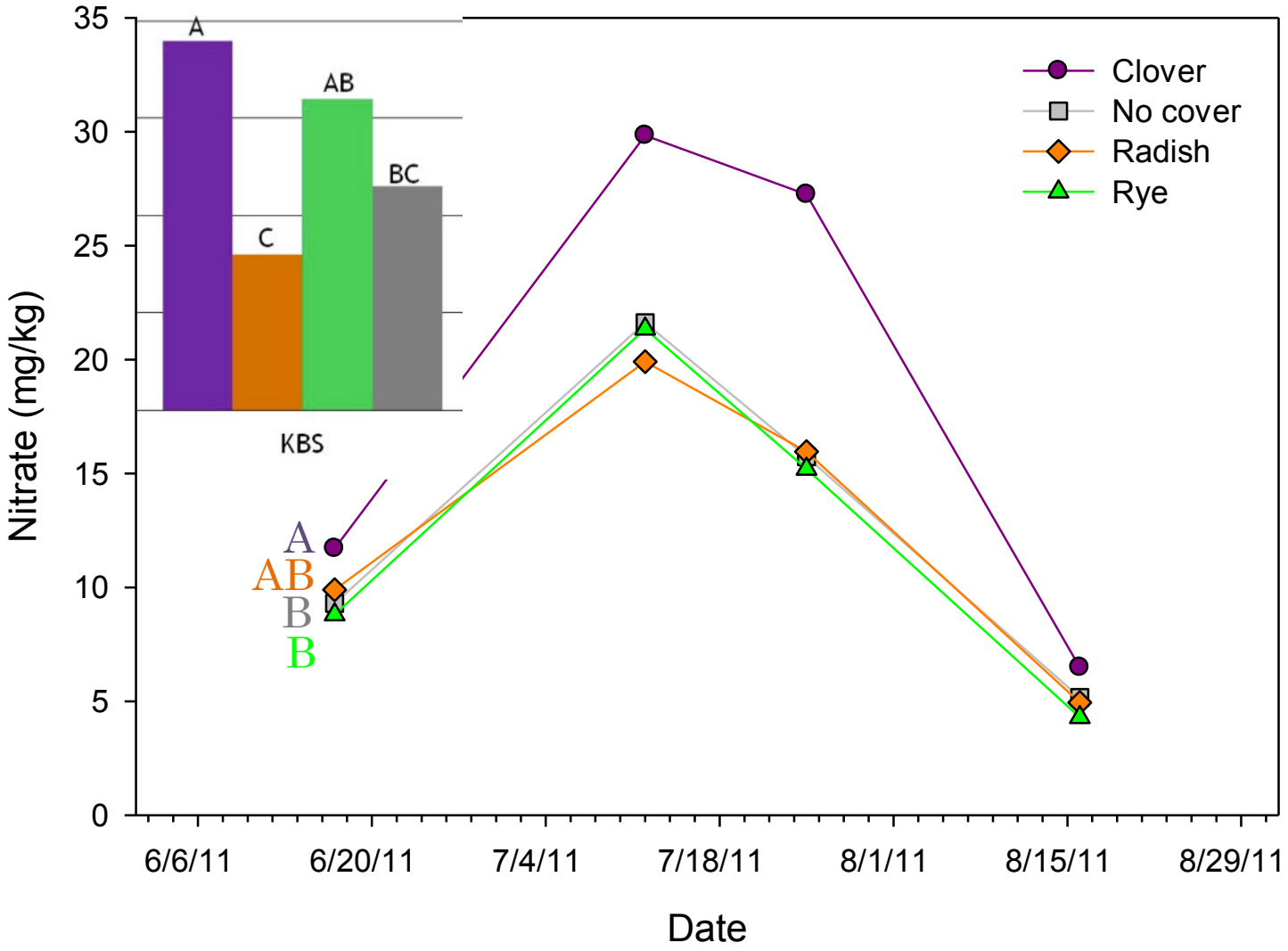


NITROGEN: CHLOROPHYLL CONTENT (V2)

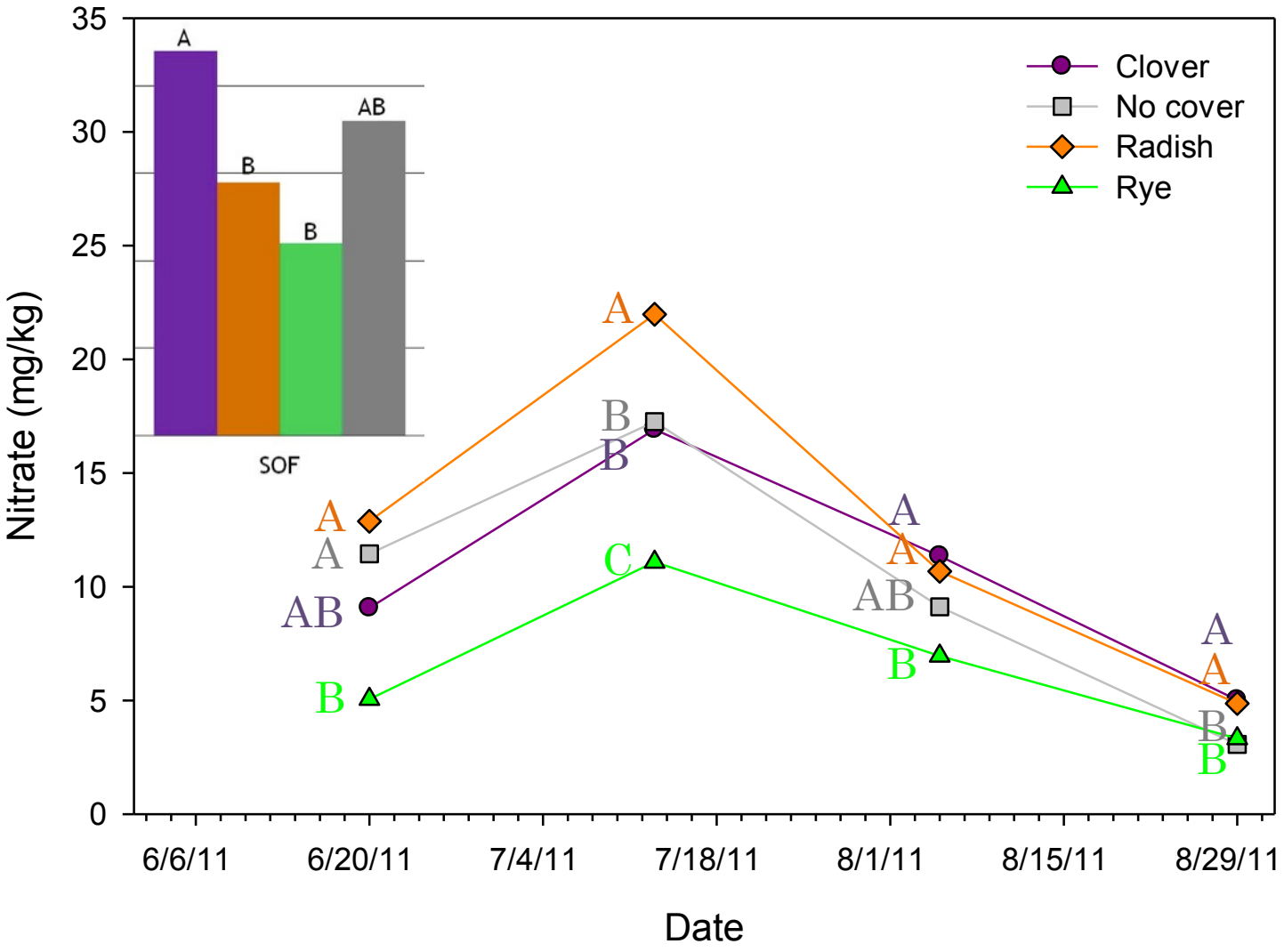


No effect of cover @ R1 and R5

NITROGEN: KBS SOIL SAMPLES



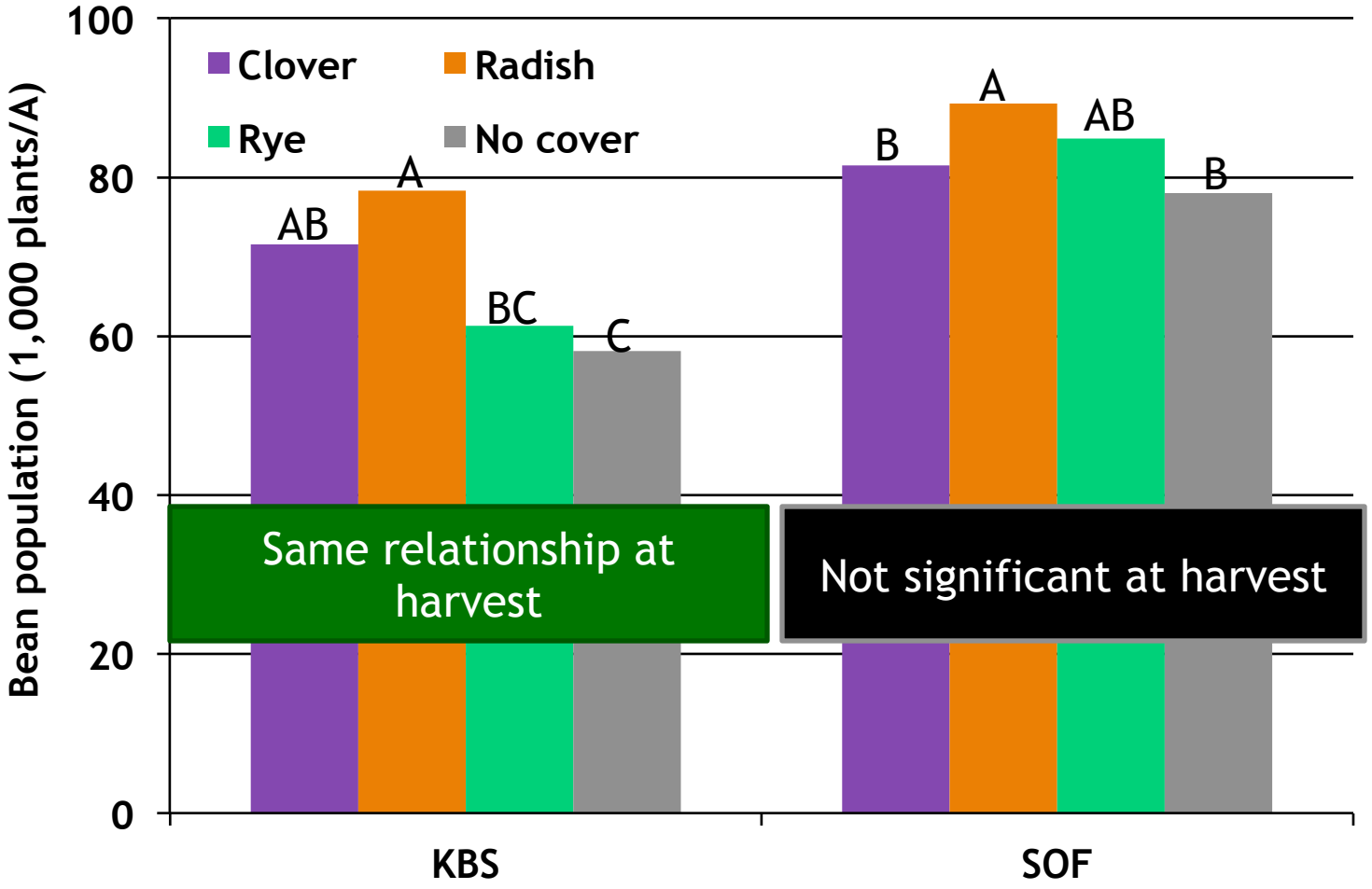
NITROGEN: SOF SOIL SAMPLES



NITROGEN: ION EXCHANGE RESIN STRIPS

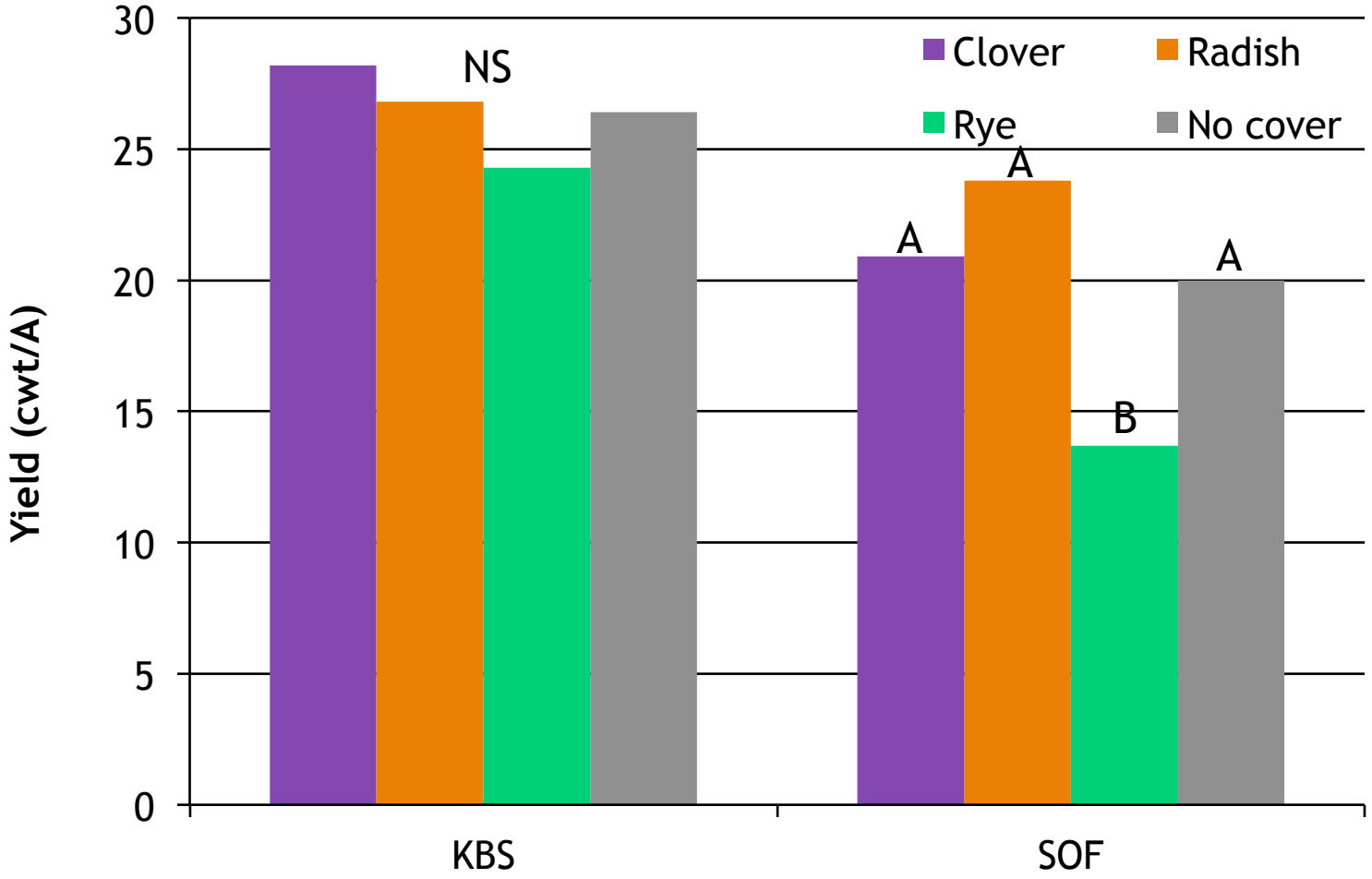
- Did not pick up significant difference among cover crops at any timing
- 4-6 weeks after planting = peak nitrate availability, similar to soil samples

Dry Bean Populations (V2)



*Planting population = 120,000 seeds/A

Dry Bean Yield



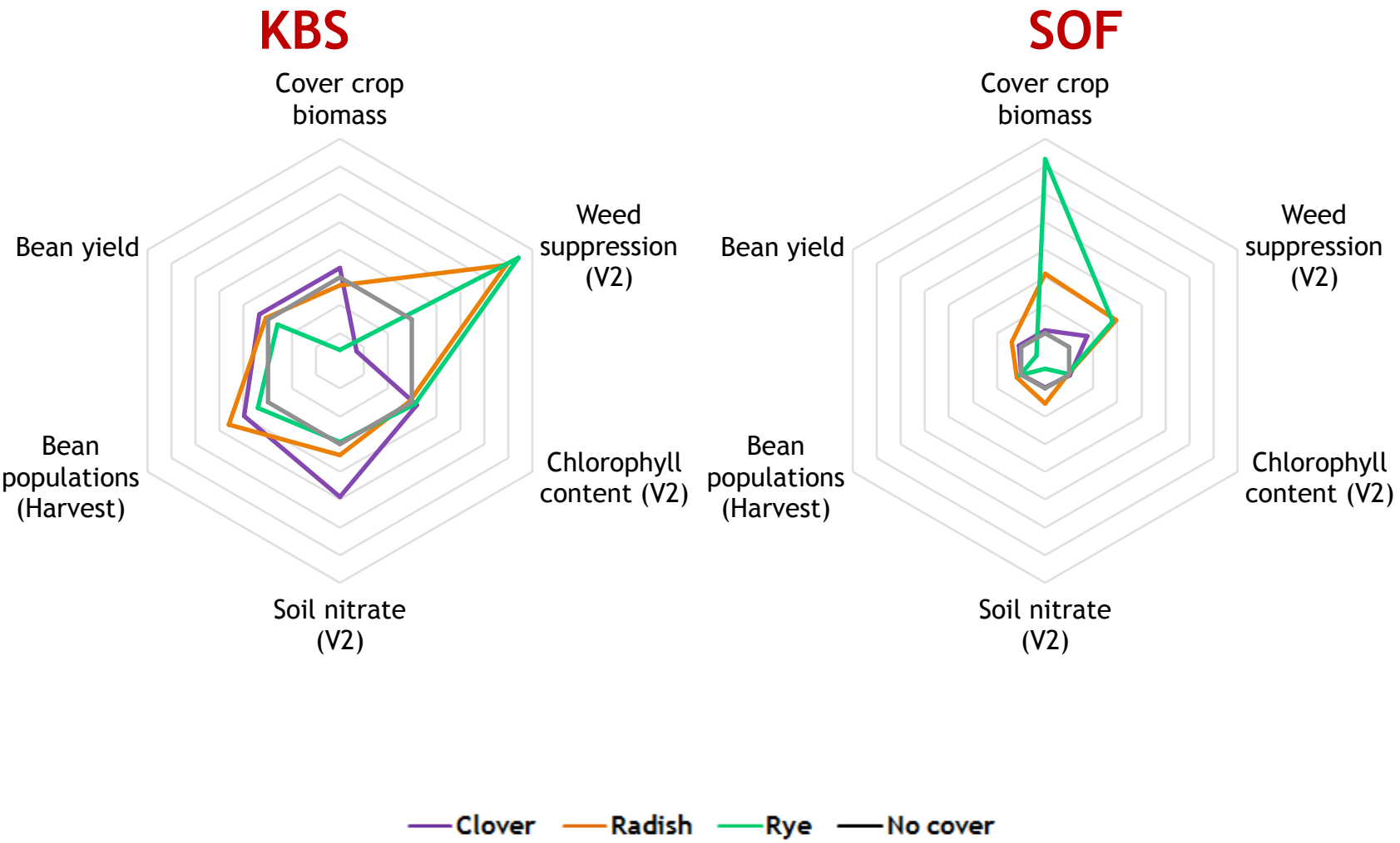
YIELDS: KBS

	Clover 28.2	Rye 24.3	Oilseed 26.8	No Cover 26.4
Zorro 27.9A	30.5	23.4	28.6	29.1
Black velvet 26.9A	27.9	25.4	27.5	26.7
Vista 27.5A	30.0	26.0	28.4	27.6
R99 23.4B	26.5	22.4	22.6	22.1

YIELDS: SOF

	Clover 20.8A	Rye 13.7B	Oilseed 23.8A	No Cover 20.0A
Zorro 19.4 B	20.5	12.7	23.7	20.9
Black velvet 22.7A	24.0	14.0	26.0	22.9
Vista 18.4B	19.7	14.0	23.1	16.8
R99 17.8B	19.2	10.3	22.5	19.3

Conclusions After Year 1



Conclusions After Year 1

- Cover crops suppressed weeds for dry bean crop
- Dry bean yields can be reduced if rye is incorporated late
- Increased cholorophyll/nitrogen content and soil availability at the V2 stage (following clover or oilseed radish) did not translate into greater yields
  - Was seed N/protein increased?

Future Directions

- Repeat experiment for 2 additional years
- Concurrently conduct larger scale trials on Michigan farms looking at the effect of cover crops on organic dry beans (see poster)

ACKNOWLEDGEMENTS

- Funding provided by the
  USDA-Organic Research and Extension Initiative

- MSU weed science crew

- MSU-SOF

- MSU-KBS

YIELDS: ON-FARM

	Clover 22.4	Rye 22.1	Oilseed 24.4	No Cover 22.9
Zorro 23.9 A	22.8	23.0	25.8	24.2
Vista 22.0 B	22.1	21.2	23.0	21.6