



***South East Research Farm Inc.***

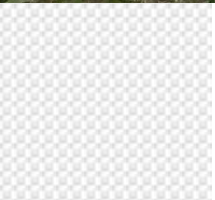
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***Redvers, Saskatchewan***

# **Intercropping Chickpea and Flax**

**Agri-Arm Research Update  
January 2015**

**ADOPT Project  
Lana Shaw MSc, PAg**



2016/4/20



# Outline -

- Why Intercropping?
- Why this combination?
- Is it practical in a large scale?
- Is it worth the trouble?
- Are producers doing it?



# Reasons to Consider Intercrops

- Agronomic Obstacles
  - Weeds, Disease pressure, Maturity
- Possibility of Over-Yielding
- Biodiversity
- Desire to complicate your life ??

An intercrop is a marriage of two crops. Not all marriages are compatible. Some are.



# Obstacles to Intercropping

- So why are we not already intercropping, if it's so great?
  - Both must be compatible with herbicide
  - Complicates seeding and harvest
  - Over-yielding is often elusive and inconsistent
  - Practical separation of harvested product
  - Market drives need to change and innovate



# Chickpea-Flax Intercrop

## Why this combo?

- High value chickpeas with big agronomic problems
  - Chickpea acreage very limited, despite good market
  - Disease problems – ascochyta blight, Indeterminate, prone to lodging
- Flax can act as ‘nurse crop’ for chickpea; flax yield is a bonus

## Specifics:

- Low cost of flax seed keeps costs down
- Herbicide: Authority pre-seed registered on both
- Low levels of shattering prior to harvest for both
- Easily separated using rotary seed cleaner



ADOPT  
Chickpea Flax Intercrop Trial  
6. CDC Cory Desi  
Chickpea  
Target 30 plants/m<sup>2</sup>



# Chickpea-Flax Intercrop

Why this combo?

## Synergy

- Late competition affects chickpea maturity ??
- Lower chickpea disease pressure ?? (Aschochyta blight)
- Both are Arbuscular Mycorrhiza Fungi (AMF) associated
- Sharing fixed N through soil fungus ??





# Objectives of research:

- Investigate the possibility that area of adaptation for chickpea can be increased
- Investigate the effect on yield and disease incidence



Aug 23, 2012 at SERF



# October 2012 – SERF Intercrop



# Intercropping Chickpea Flax Trial – 2013, 2014, 2015

3 seed rates of Kabuli Chickpea  
3 seed rates of Desi Chickpea

Compared with

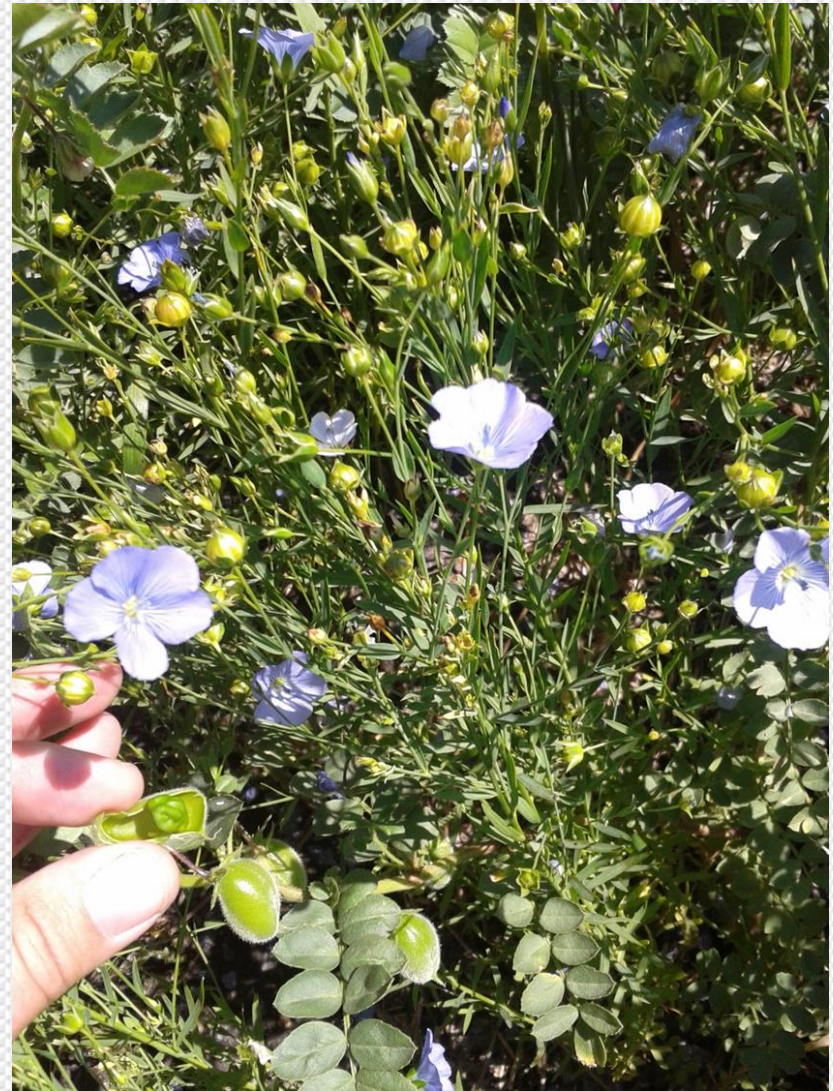
Monocropped Flax (high N)  
Monocropped Flax (low N)  
Monocropped Kabuli  
Monocropped Desi

Locations in 2014:

Redvers, Indian Head, Scott,  
Outlook, Swift Current

Locations in 2015:

Redvers, Indian Head, Outlook,  
Scott



## Materials and Methods – 2014, 2015

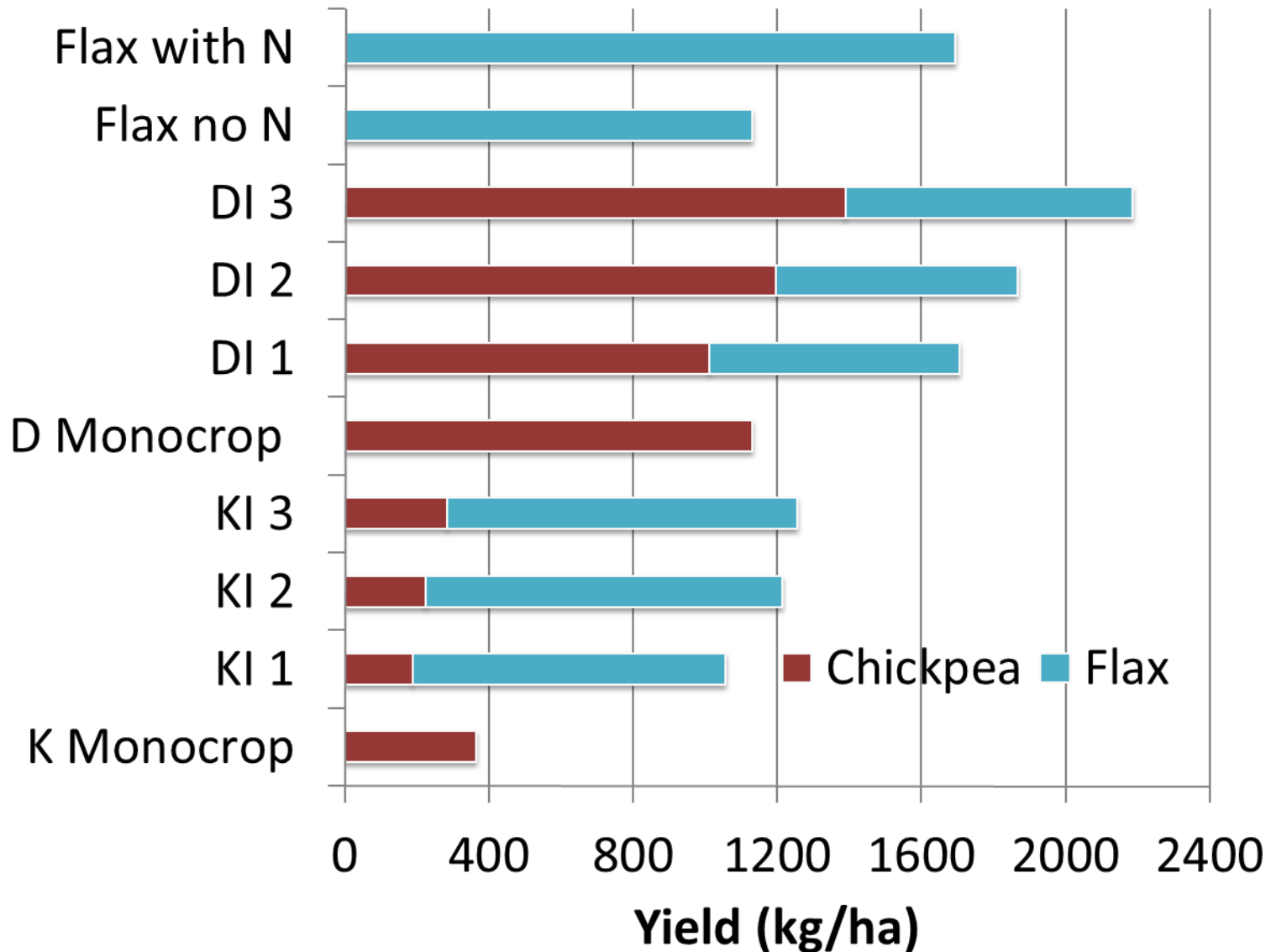
- CDC Alma Kabuli Chickpea
- CDC Cory Desi Chickpea
- Three target seeding rates for intercrops
  - 30 pl/m<sup>2</sup>
  - 40 pl/m<sup>2</sup>
  - 50 pl/m<sup>2</sup>
- Monocrop seeding rates were 40 pl/m<sup>2</sup> chickpea
- Flax
  - 40 lb/ac intercrop
  - 56 lb/ac monocrop

## Desi Chickpea (40 pl/m<sup>2</sup>) and Flax

- Faster row closure
- Weed competition
- Canopy structure is altered
- Chickpeas are less branched, more upright
- Airflow and humidity in canopy is likely altered

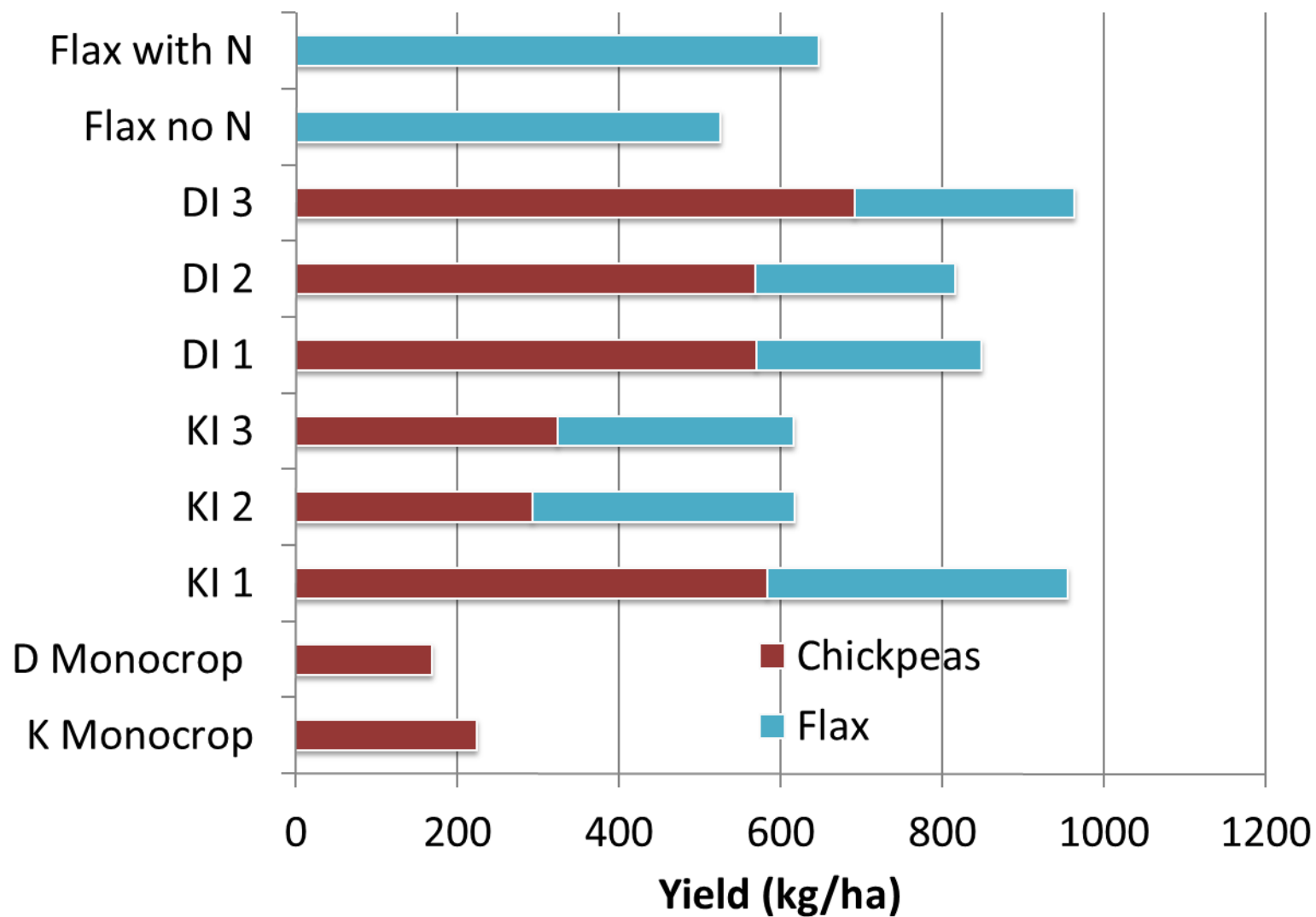


# Redvers 2013 – Trial Yields

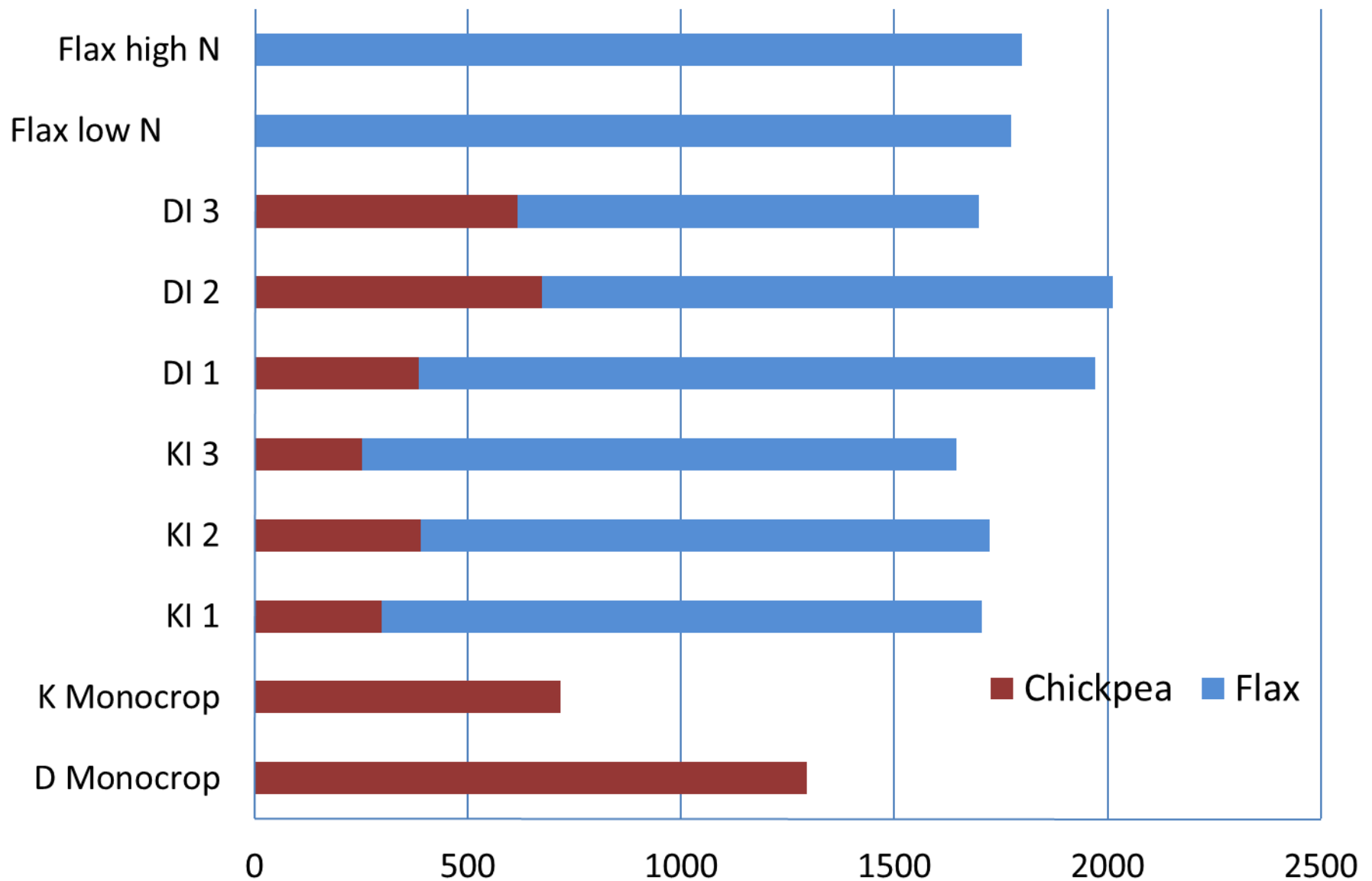




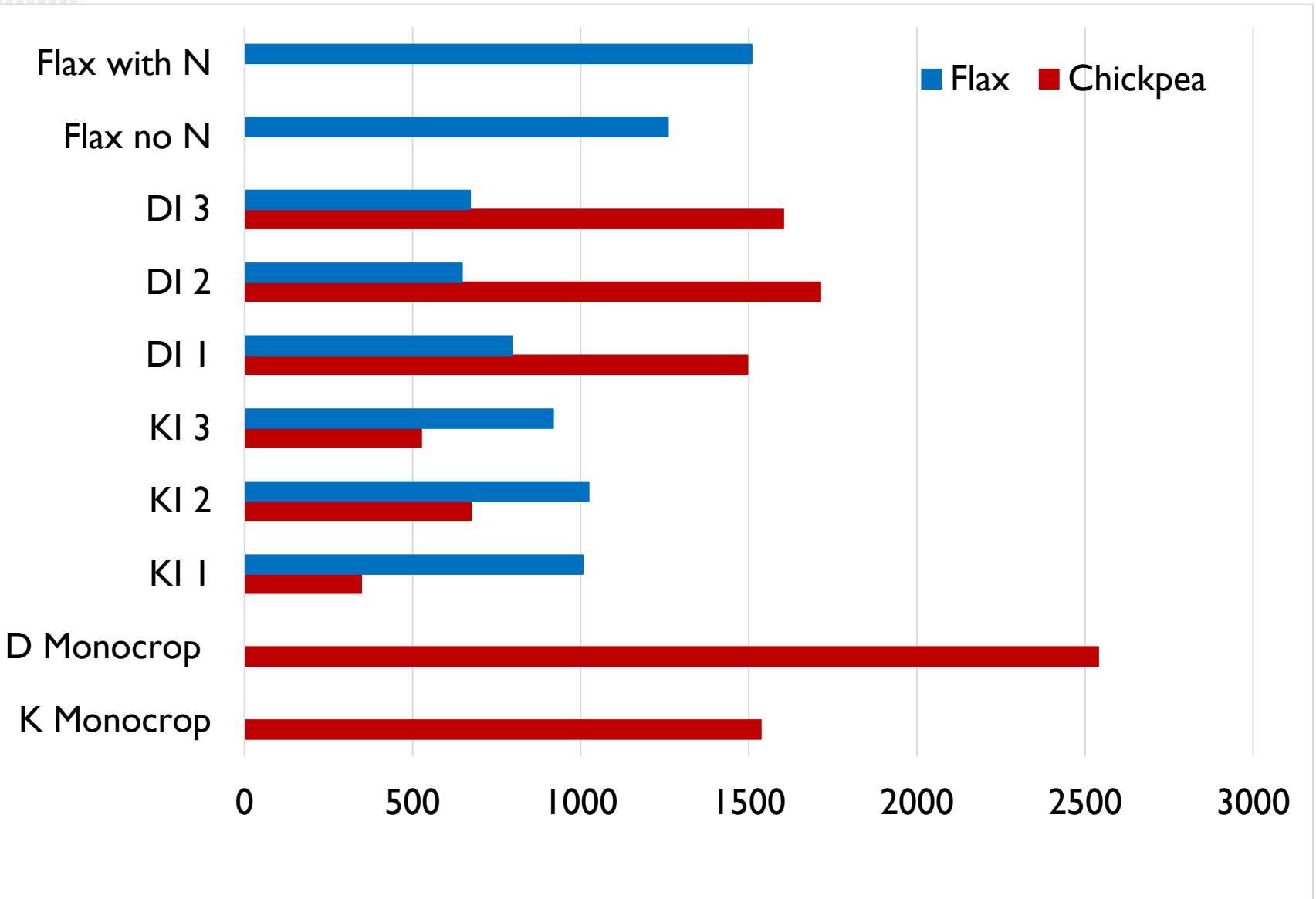
# Redvers 2014 – Trial Yields



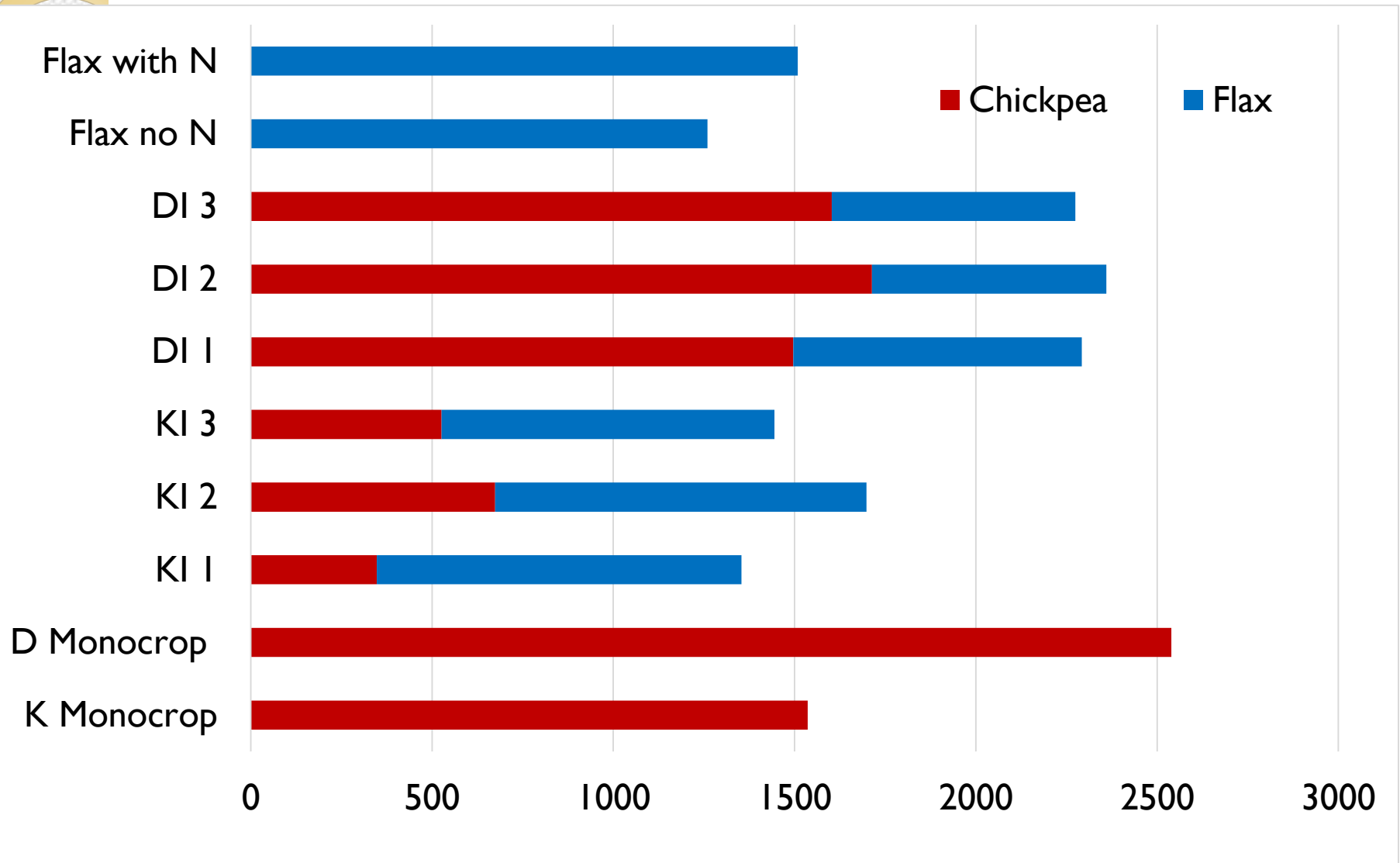
# Outlook 2014 Yield Results (kg/ha)



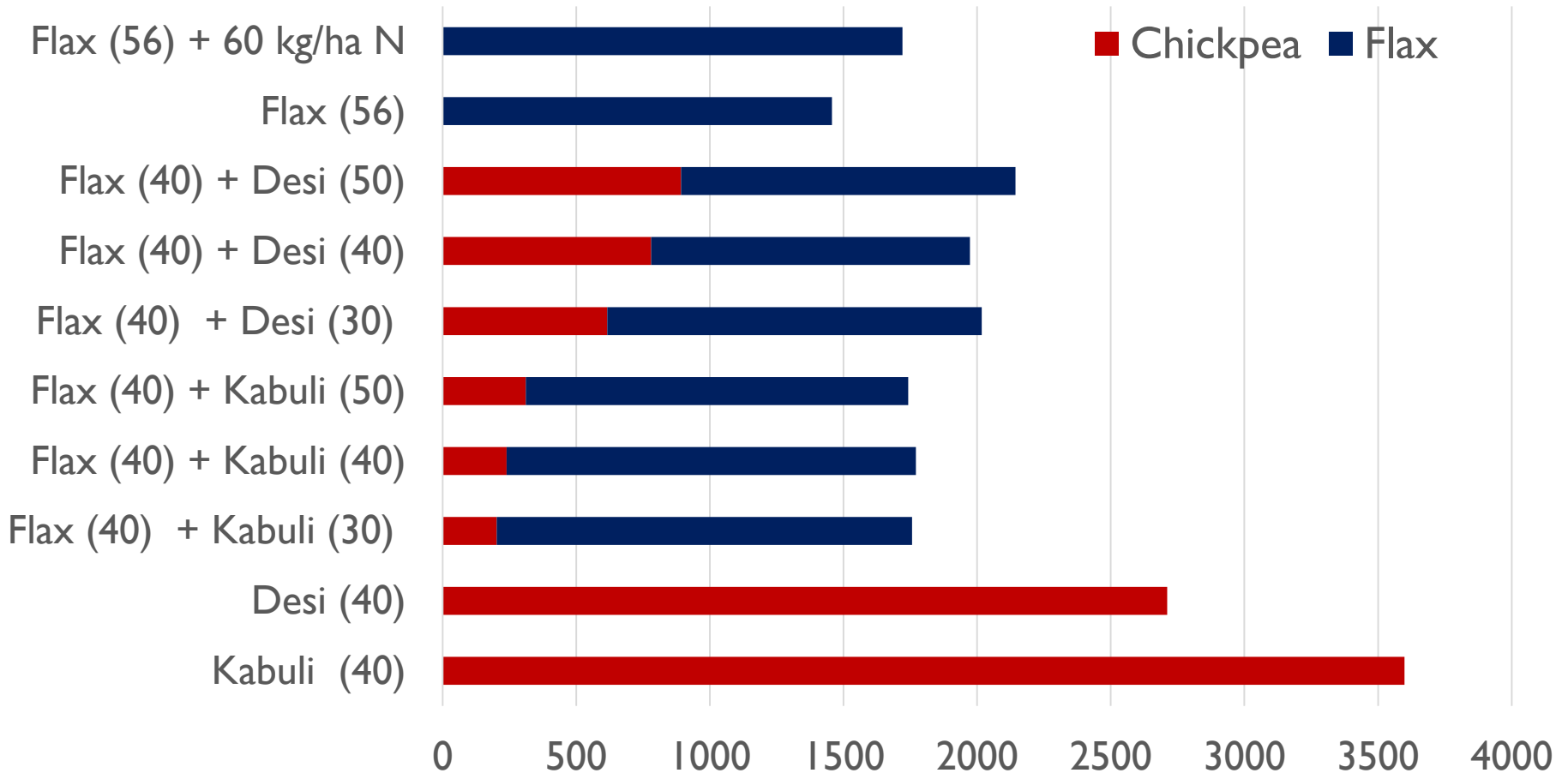
## Redvers 2015 – Yield Results



# Redvers 2015 – Yield Results (kg/ha)



# Scott 2015 Yield Results (kg/ha)



# Land Equivalency Ratio

		LER	LER
		no N flax	N flax
<b>2014-15</b>	Kabuli	1.3	1.1
<b>Redvers</b>	Desi	1.4	1.3
<b>2015</b>	Kabuli	1.1	1.0
<b>Redvers</b>	Desi	1.2	1.1
<b>2014</b>	Kabuli	2.4	2.3
<b>Redvers</b>	Desi	3.1	3.0
<b>2015</b>	Kabuli	1.1	1.0
<b>Scott</b>	Desi	1.2	1.0
<b>2014</b>	Kabuli	1.0	1.0
<b>Outlook</b>	Desi	1.5	1.5

## Redvers 2014

Disease incidence was reduced in intercrop plots

Chickpea *Aschocyta*  
Incidence on Aug 30 (% severity):

51% for monocrop plots

17% for intercrop plots

☐ Significant difference



Horizontal leaf structures  
seal in humidity

Lodging was 2.5 in monocrops  
and averaged 1.5 in intercrop

**Monocrop Desi**





# Ongoing Goals

Identify combinations of production practices that work best for desi and kabuli intercrops with flax.

Seeding rate of flax needs to be investigated.





## **Nitrogen dynamics are unknown**

**SPG is funding an N15 study led by Dr. Fran Walley**

- **Apply N15 and sample biomass from Chickpea intercropping trials**
- **Two years of field trial finished, data not yet available**



# Will producers do it? Yes

2013 One Producer, one trial site

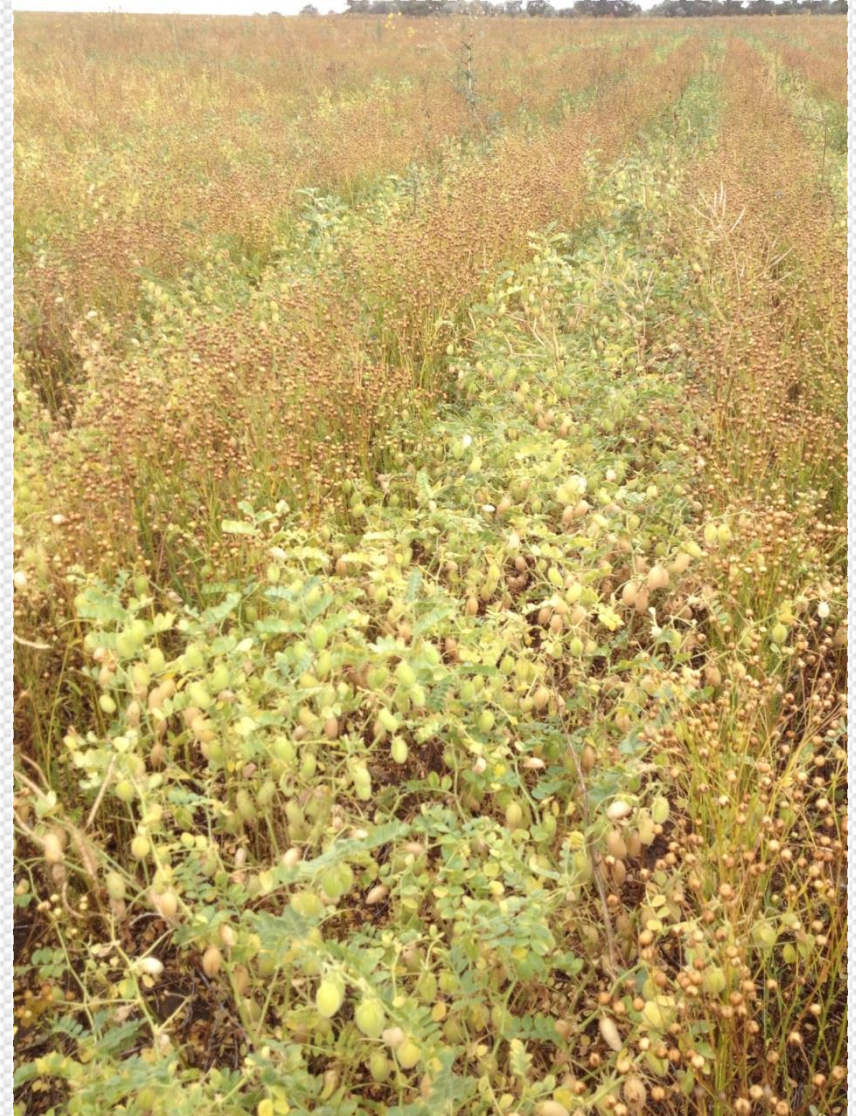
2014- One Producers, several trial sites

2015 - At least 3 Producers, hundreds of acres, several trial sites

2016 – Producer Interest but no funding for trials (some will go ahead regardless)



Colin Rosengren – production field, Midale area



# Derek Axten – Milestone 2015

## Several hundred acres - desiccating



# Derek Axten - droughty field from 2015



2016/4/20





# Is this Practical? Yes

## Seeding

- Ideally - one pass with airseeder
  - Run chickpeas instead of fertilizer in side band
    - Seed flax normally
    - Allows deeper placement of chickpea, shallower flax
  - Or
  - Get fancy – Alternate rows
    - Alternate row may be best
    - Requires alterations on airseeder

## Best Advice So Far

- Use Authority herbicide unless organic producer
- Cereal stubble good – canola stubble bad
- Seed chickpeas deeper than flax and at same time
- Talk to producers who have tried it to work out combine settings

# Is this Practical? Yes

## Harvesting

- Dessication may still be necessary
- Plants are more upright = faster combining
- Chickpeas thresh the flax bolls
- Set combine for chickpea, but turn down air



# Is it worth the trouble?

- Overyielding (Land Equivalency Ratio) says yes
- Improved agronomics says yes
  - Less disease pressure
  - Less lodging
  - Improved maturity



# Is it worth the trouble? Likely

- Extra time during harvest to set up separation of product
- Canola volunteers are not controlled
- Dollars will make that decision
- No N fertilizer is required and minimal pesticides are called for
- Frees up operator time also

Chickpea	Desi Intercrop	Desi Monocrop	Kabuli Intercrop	Kabuli Monocrop	Flax (black soil zone)
<b>Yield</b>	1200lb/ac 12 bu flax	1100 lb/ac	1400 lb/ac 12 bu/ac flax	1300 lb/ac	24 bu/ac
<b>Revenue</b>	\$315 + 150 = \$465/ac	\$297	\$490 + 150 = \$640/ac	\$455	\$300
<b>Seed costs</b>	36 + 11	36	69 + 11	69	11
<b>Fertilizer</b>	13	13	13	13	49
<b>Herbicide/Fungicide</b>	36	36	36	53	14
<b>Inoculant</b>	11	11	25	25	
<b>Total Input Cost</b>	107	96	143	160	74
<b>Return over inputs</b>	<b>350</b>	<b>200</b>	<b>500</b>	<b>300</b>	<b>230</b>



# Chickpea-Flax Intercropping

- Research and producer experience indicates there is exciting potential here.
- Reduced need for inputs combined with increased crop value = win win for farmers
- No N fertilizer is required and minimal pesticides are called for



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