“LIVING PLANTS”
AS SOLAR COLLECTORS

ROBIN GRIFFETH
(OLD GUY)

KELLY GRIFFETH
(YOUNG GUY)
WE DEAL IN SOLAR ENERGY AS WELL AS WATER MANAGEMENT
OUR SOLAR COLLECTORS ARE LIVING PLANTS
THE WATER IS RAINFALL, WHICH WE ALSO MANAGE WITH LIVING PLANTS
THE LIVING PLANTS IMPROVE SOIL HEALTH, SOIL PRODUCTIVITY AND REDUCE EROSION
WHEN MOST PEOPLE THINK OF SOLAR COLLECTORS, THEY THINK OF SOLAR PANELS THAT CONVERT THE SUN'S ENERGY INTO ELECTRICITY.

THOSE ARE VERY “GREEN” INVENTIONS.
HOWEVER

THE ORIGINAL SOLAR COLLECTOR

IS THE LEAF OF A GROWING PLANT
• 2015 marked our 20\textsuperscript{th} year of continuous no-tillage.

• I had 2 main reasons for adopting no-till in 1995.

1. To conserve moisture.

2. To reduce erosion. I was tired of seeing our soil wash and blow away.
• IN 1995 WE HAD THREE MAIN CROPS
  WHEAT, MILO, AND A FEW SOYBEANS

• IN 2015 WE PRODUCED 8 CASH CROPS:
  WHEAT, TRITICALE, BARLEY, OATS, MILO, CORN,
  SUNFLOWER, BUCKWHEAT
NOT TO MENTION NUMEROUS OTHER COVER CROP SPECIES
• THESE ARE ALL TOOLS TO HELP US HARNESS THIS FREE SOLAR ENERGY
TOOLS: Crops

• Cash Crops
  – are used to generated cash for us to stay in business. They are also FOOD, so treat them as such.

• Cover Crops
  – A diverse bridge crop grown between the harvest of one cash crop and the planting of another.
COMPANION CROPS

Cash crop and cover crop
grown simultaneously
COMPANION CROP

DOUBLE CROP SUNFLOWER WITH PEAS, BUCKWHEAT, ECT.
WE WOULD RATHER HARVEST SUNLIGHT THAN WASTE IT HEATING THE SOIL
HOW WE BEGAN PLANTING DC SUNFLOWER W/INNER CROP

WHITE 6531, 31/15” ROWS
STOCK EXCEPT FOR KEETON SEED FIRMERS & THOMPSON CLOSING WHEELS
NO RESIDUE MANAGERS OR COULTERS
WORKS GREAT PLANTING INTO COVER CROPS
A PLANTER IS A GREAT WAY TO CONTROL PLANTING RATES, DEPTH, ETC.

DOUBLE CROP SUNFLOWER WITH COW PEAS AND NON GMO GROUP 7 SOYBEAN BETWEEN 30 INCH SF ROWS
SAME MIX IN 15 INCH ROWS.

SUNFLOWER, COW PEA, AND NON GMO GROUP 7 SOYBEAN PLANTED TOGETHER IN 15 INCH ROWS WITH WHITE PLANTER.
A DRILL ALLOWS FOR MUCH MORE DIVERSE MIXES.

DIVERSITY DRIVES BIOLOGY
BIOLOGY DRIVES THE SOIL
A DRILL MAKES IT MUCH EASIER TO PLANT
SOMETHING LIKE THIS
SEED SEPARATION WAS A CONCERN AT FIRST
BUT NOT SO MUCH ANY MORE
We do some homework in designing a mix. We study SARE books, Internet sites, even gardening sites.

<table>
<thead>
<tr>
<th>Vegetables</th>
<th>Common name</th>
<th>Scientific name</th>
<th>Helps</th>
<th>Helped by</th>
<th>Attracts</th>
<th>Repels/Distracts</th>
<th>Avoid</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alliums</td>
<td></td>
<td></td>
<td>nightshades</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Asparagus</td>
<td>Asparagus officinalis</td>
<td></td>
<td>Tomatoes</td>
<td>Aster Family flowers, Dill, Coriander, Tomatoes, Parsley, Basil, Comfrey, Marigolds</td>
<td></td>
<td></td>
<td>Onion, Garlic, Potatoes</td>
<td></td>
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<tr>
<td>Brassicas</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Beans</td>
<td>Phaseolus</td>
<td>Corn (see Three Sisters), Summer savoury</td>
<td>Eggplant, Summer savoury</td>
<td></td>
<td>California beetles</td>
<td>Tomatoes, chili peppers, alliums (onions, garlic, etc.), brassicas (cabbage, broccoli, etc.)</td>
<td>Hosts nitrogen-fixing bacteria, a good fertiliser for some plants, too much for others</td>
<td></td>
</tr>
<tr>
<td>2013 COMPANION CROP</td>
<td>#’s / ACRE</td>
<td>SEEDS / POUND</td>
<td>SEEDS / ACRE</td>
<td>TOTAL SEEDS / ACRE</td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SUNFLOWER</td>
<td>3</td>
<td>8,000</td>
<td>24000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>COWPEA</td>
<td>15</td>
<td>4,100</td>
<td>61,500</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>BUCKWHEAT</td>
<td>5</td>
<td>18,000</td>
<td>90,000</td>
<td></td>
<td></td>
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<tr>
<td><strong>TOTAL W.S. CROPS</strong></td>
<td><strong>23</strong></td>
<td></td>
<td><strong>175,500</strong></td>
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<tr>
<td>COOL SEASON CROPS</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>OATS (HOLDS MIX TOGETHER)</td>
<td>10</td>
<td>2,500</td>
<td>25,000</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>COMMON VETCH</td>
<td>2</td>
<td>8,000</td>
<td>16,000</td>
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<td></td>
<td></td>
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<tr>
<td>RAPE</td>
<td>1</td>
<td>175,000</td>
<td>175,000</td>
<td></td>
<td></td>
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<tr>
<td>WINTER PEAS</td>
<td>5</td>
<td>4,000</td>
<td>20,000</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>CRIMSON CLOVER</td>
<td>1</td>
<td>107,200</td>
<td>107,200</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>ALFALFA</td>
<td>1</td>
<td>147,000</td>
<td>147,000</td>
<td></td>
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<tr>
<td>YELLOW MUSTARD</td>
<td>1</td>
<td>100,000</td>
<td>100,000</td>
<td></td>
<td></td>
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<tr>
<td><strong>TOTAL C.S. CROPS</strong></td>
<td><strong>21</strong></td>
<td></td>
<td><strong>590,400</strong></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td><strong>TOTAL OF ALL 10 CROPS</strong></td>
<td><strong>44</strong></td>
<td></td>
<td><strong>765,900</strong></td>
<td></td>
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</tbody>
</table>
This is the seed tag that Green Cover sends with you when you pick up your mix.

<table>
<thead>
<tr>
<th>Green Cover Seed Mix Analysis</th>
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</thead>
<tbody>
<tr>
<td><strong>Robin Griffeth</strong></td>
</tr>
<tr>
<td><strong>DC Sunflower Mix</strong></td>
</tr>
</tbody>
</table>

**Seeding Rate:** 44 lbs/acre  
**Tote Wt:** 2103  
**Tote of 6**

<table>
<thead>
<tr>
<th>Legumes</th>
<th>lbs/acre</th>
<th>% by wt</th>
<th>Lot</th>
<th>Origin</th>
<th>Germ</th>
<th>Purity</th>
<th>Other</th>
<th>Inert</th>
<th>Weeds</th>
<th>Test</th>
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</thead>
<tbody>
<tr>
<td>Iron &amp; Clay Cowpeas</td>
<td>20.0</td>
<td>45%</td>
<td>1363</td>
<td>FL</td>
<td>90.00%</td>
<td>98.04%</td>
<td>0.42%</td>
<td>1.54%</td>
<td>0.00%</td>
<td>12/26/13</td>
</tr>
<tr>
<td>Clover - Yellow Sweet</td>
<td>4.0</td>
<td>9%</td>
<td>13-004 CTD</td>
<td>Can</td>
<td>80.00%</td>
<td>64.96%</td>
<td>0.73%</td>
<td>34.19%</td>
<td>0.12%</td>
<td>1/1/14</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Grasses</th>
<th>27%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rockford Oats</td>
<td>12.0</td>
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</tbody>
</table>

| Brassicas | 0% |

<table>
<thead>
<tr>
<th>Other Broadleaves</th>
<th>18%</th>
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</thead>
<tbody>
<tr>
<td>Buckwheat</td>
<td>5.0</td>
</tr>
<tr>
<td>Sunflower</td>
<td>3</td>
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</tbody>
</table>

Total wt of mix (all bags): 13,200
WE LIKE BUCKWHEAT, COWPEAS, RAPE SEED, AND CLOVERS JUST TO NAME A FEW
WE LIKE COW PEAS WITH SUNFLOWER
COW PEAS SEEM TO JUMP OUT OF THE GROUND AND HELP EVERYTHING ELSE GET UP AND GOING, AS WELL AS OTHER BENEFITS.
THEY NODULATE AND PRODUCE SOME NITROGEN
WE LIKE BUCKWHEAT

BUCKWHEAT ATTRACTS MANY BENEFICIAL INSECTS, CREATES ACIDS THAT HELPS MAKE PHOSPHATE MORE AVAILABLE.............AND IS A GREAT SOIL CONDITIONER.
2012 BUCKWHEAT CROP IN FULL BLOOM

SWARMING WITH BEES, PREDITORIAL WASPS, AND LADY BEETLES.
POLLINATING INSECTS AS WELL AS PREDITORIAL INSECTS ARE A MUST IN OUR SUNFLOWER PRODUCTION
WE NOT ONLY HAVE PLANT DIVERSITY......WE ALSO HAVE INSECT DIVERSITY
EVERY PLANT NEEDS TO HAVE A PURPOSE !!!!!
NO PLANT SHOULD BE ANTAGONISTIC TO THE PRESENT OR NEXT CASH CROP
NO PICKET FENCE STANDS WITH A DRILL
WE ARE WILLING TO GIVE UP SOME CONTROL TO GAIN DIVERSITY
CROP DIVERSITY DRIVES SOIL BIOLOGY DIVERSITY

SOIL BIOLOGY DIVERSITY DRIVES THE SYSTEM
COLLECTING SOLAR ENERGY
DIVERSITY

PHOTOSYNTHESIS
KEEPS YOUR NEIGHBORS GUESSING

WHAT THE HECK DID HE PLANT NOW???
FOR AWHILE, YOU MAY WONDER WHAT HECK YOU DID
BUT WE CAN GUARANTEE THAT YOU WON’T BE ABLE TO STAY OUT OF THESE FIELDS
SOON YOU WILL SEE THINGS START TO DEVELOP
PHOTOSYNTHESIS

DIVERSITY
KNOWN AS THE “FOREST EFFECT”

THERE ARE TALL PLANTS, SHORT PLANTS AND EVERYTHING IN BETWEEN
SUN HEMP
MORE DIVERSITY
MORE DIVERSITY
NO SUNLIGHT WASTED HERE.

PHOTOSYNTHESIS AT IT’S BEST
THEN IT STARTS TO RESEMBLE A SUNFLOWER FIELD
BUT YOU CAN STILL SEE A LOT OF DIVERSITY
DIVERSITY
WE STILL HAVE SOME ISSUES IN OUR “PARKING LOTS”
THEN IT STARTS TO GET UGLY..................................BUT THERE IS STILL GREEN IN THERE
HOW WE HARVEST SUNFLOWER
SWEET CLOVER HAS BEEN HIDING, AND IS NOW COMING INTO PLAY
2013 HARVEST TIME.....SALINE SEEP.
THIS IS WHY I PLANTED THE RAPE SEED.

KOCHIA & RAPE SEED GROWS, FLOWERS DON’T. RAPE STILL DOING WELL AT HARVEST. IT ALSO LET US DRIVE ON GREEN MATTER. NO FIRES!!
SAME SPOT IN 2014 MILO.

1st TIME I’VE SEEN MILO GROW IN THAT SPOT

NO GRAIN FILL, BUT AT LEAST WE HAD GROWING ROOTS
EVERY PLANT HAS A PURPOSE !!!!!
DIVERSITY, BUT TAKE INTO CONSIDERATION YOUR MANAGEMENT
REMEMBER THIS SLIDE??
SAME MIX IN 15 INCH ROWS.

SUNFLOWER, COW PEA, AND NON GMO GROUP 7 SOYBEAN PLANTED TOGETHER IN 15 INCH ROWS WITH WHITE PLANTER.
DO YOU THINK COMPANION PLANTING COULD BE IN YOUR FUTURE ???
WE BELIEVE THAT THERE FUTURE IS IN COMPANION CROPPING
QUESTIONS?
WE STARTED WITH SUNFLOWER AND PEA
WE ARE STILL WITH SUNFLOWER AND PEA.
HOWEVER WE ARE EXPANDING OUR THINKING
OAT / PEA MIX WOULD BE A FANTASTIC GRAZING CROP
THIS BEGAN AS A COVER CROP
THEY TURNED INTO TWO CASH CROPS INSTEAD OF ONE. HARVESTED TOGETHER AS GRAIN, THEN SEPARATED HOWEVER, DO TO WEATHER
DC Corn and Canola
RR Canola intercropped into Corn
DC Corn and Canola again...
THE WHEAT WAS POOR ON THIS FIELD, SO NO ADDED NITROGEN FOR THE CORN/CANOLA
COMBINE CUTTING CORN AT RANDALL
HIGH CARBON COVERS ARE FABULOUS
AN ENORMOUS AMOUNT OF DIVERSITY CAN BE ADDED HERE
CHECKING PLANT AND INSECT SPECIES
WOW !!!!  LOOKS LIKE ANOTHER PATCH OF SEDAN
UPON FURTHER INSPECTION THERE IS DIVERSITY

DIVERSITY AS WELL AS FOREST EFFECT
DIVERSITY
DIVERSITY
THEN MOTHER NATURE GRAZED IT
MY !!!! OH !!!! MY !!!!
• THE FIELDS IN THE NEXT TWO SLIDES DO NOT BELONG TO US. WE BEG FORGIVENESS FROM THE OWNERS, BUT WE FEEL THAT THE PHOTOS NEED TO BE SEEN.
HISTORY: HAD A GRAZING COVER CROP IN 2013, NOW GROWING CORN LOOKS GOOD. JUST HAD 4.5 INCH RAIN.
ANOTHER NEIGHBOR’S FIELD

WEST SIDE OF HIGH WAY

HISTORY: INTENSE TILLAGE !!!! NO COVERS !!!! SAME 4.5 INCH RAIN !!!!

JUST PLANTED TO MILO
TURKEY RED