

Nominate safflower line C17 for use in bird and ruminant wildlife food plots, cover crop mixtures, annual late summer and fall graze, and safflower for grain (birdseed) in areas with elevations between 3300 to 4300 feet. Areas typically too cool for standard safflower production. C17 was developed through repeated plantings, since 1986, of the Sidney Bulk Safflower population with the variety Partial Hull mixed in to increase out crossing. Partial Hull has some male sterility. Early on early flowering and reduced spine/spineless plants were selected and bulked to shift the population toward earlier maturity and spineless character. Also, the orange and red flower colors were preferred as indication of the Partial Hull influence and differentiate the spineless lines from the standard cultivars which are mostly yellow flowered. Table 1 presents the results of a 2014 May 1 safflower trial seeding at the CARC. C17 ranked third for seed yield in this trial at 778 lbs per acre, with a test weight of 43.3 lbs/bu and 26.3 percent oil content. At the Geraldine location, planted April 21, 2014, C17 ranked 5th for yield with a test weight of 43.5 lbs/bu and an oil content of 29.5%. A third trial planted April 24, 2014, at the CARC, C17 had similar yield as the later seeded trial, 794 lbs/a, but other entries in the trial had higher yields. C17 in this third trial C17 had attest weight of 45.5 lbs per acre.

Why C17 and not just C24 or Baldy. While the yields of C17 have not been tracked closely through the years, it comes from a composite of lines that have been consistent earlier flowering, uniform in height and red orange color. There is variability in leaf shape and bract shapes within C17. Should we experience a cooler growing season than we have had for several years, C17 is the line that I have the most confidence in to produce a respectable seed.

Why not delay another year or two? It looks like other lines have potential. We do not have resources to spend on a minor use crop such as spineless safflower for habitat, forage and some grain production. The market has developed for spineless safflower amongst Ag producers and upland bird development enthusiast and they are asking, "When can they get some spineless safflower seed?" The cover crops for grazing forage is an emerging market, at present.

We have on hand over 200 lbs of breeder's seed, sufficient quantity to meet the immediate seed trade demand.

Suggested name: Rubis Red in honor of Dr. Dave Rubis developer of Partial Hull and many other safflower varieties.



See a safflower narrative at the end of this document. It presents some safflower forage information.

Table 1 2014 CARC CC Spineless Safflower Development Line Evaluations 1477701
Exp 1477701 Central Agricultural Research Center, Moccasin, Montana

| Code ID | Source | Entry | Flower | Flower | Plant | Seed | Test | Oil | Oil | Flower |
|----------------|--------------------------|-----------|-----------|-----------|-----------|------------|-------------|-------------|------------|--------------|
| | | | 31-Jul | 5-Aug | Ht14Oct | Yield | Weight | Content | Yield | Color |
| | | | % | % | cm | lbs/ac | lbs/bu | % | lbs/ac | |
| SaffD 14 | orange | 25 | 36 | 91 | 74 | 881 | 43.8 | 26.5 | 234 | YO Y |
| C18 | Short 6S C18 | 5 | 9 | 92 | 72 | 828 | | | | O rdd |
| C17 | 2013Sdpass53,54,5 | 4 | 11 | 93 | 68 | 778 | 43.3 | 26.3 | 204 | O rdd |
| SaffD 24 | | 23 | 11 | 94 | 74 | 749 | 43.9 | 25.5 | 171 | Y O YO |
| A311 | 11Saf11 | 15 | 15 | 93 | 78 | 746 | 43.5 | 26.8 | 199 | YO O Y |
| C16 | red 13 S C16 | 3 | 10 | 96 | 72 | 715 | | | | OY |
| C24 | C24 | 11 | 12 | 98 | 71 | 689 | 45.1 | 25.0 | 171 | white |
| C21 | 4th S C21 | 8 | 13 | 97 | 67 | 685 | 43.7 | 26.5 | 181 | O rdd |
| C22 | 11th S C22 | 9 | 8 | 96 | 69 | 682 | 44.6 | 24.8 | 170 | YW |
| SaffD 13 | orange | 24 | 14 | 95 | 75 | 678 | | | | YO O |
| C14 | Red 3 S C14 | 1 | 13 | 94 | 68 | 676 | 42.4 | 25.6 | 192 | O rdd |
| C08 | Baldy47 N C8 | 12 | 11 | 97 | 68 | 670 | 45.0 | 24.5 | 164 | white |
| C19 | 5th S 105 C19 | 6 | 12 | 98 | 72 | 653 | | | | white |
| C20 | 12th S C20 | 7 | 7 | 95 | 70 | 645 | | | | white |
| A308 | 11Saf15 | 20 | 11 | 81 | 72 | 643 | 43.5 | 25.5 | 164 | Y YO |
| A309 | 11Saf10 | 16 | 10 | 80 | 71 | 642 | | | | Y YO |
| C23 | 2S C23 | 10 | 8 | 98 | 72 | 635 | 44.0 | 24.0 | 153 | white |
| C15 | red 14 S C15 | 2 | 13 | 90 | 71 | 633 | 42.1 | 24.8 | 159 | OY |
| A301 | 11Saf18 | 13 | 9 | 81 | 82 | 629 | | | | Y YO |
| A315 | 11Saf22 | 17 | 20 | 66 | 75 | 627 | | | | Y O spined, |
| A304 | 11Saf21 | 19 | 9 | 79 | 68 | 613 | | | | Y O |
| A303 | 11Saf17 | 21 | 13 | 85 | 73 | 611 | 43.2 | 26.3 | 161 | Y O YO |
| A302 | 11Saf01 | 18 | 8 | 74 | 71 | 589 | 41.5 | 26.3 | 173 | Y YO |
| A314 | 11Saf13 | 14 | 13 | 91 | 76 | 586 | | | | O YO |
| SaffD 11 | orange | 22 | 11 | 91 | 75 | 524 | 43.1 | 25.7 | 140 | O rdd |
| Mean | | | 12.19 | 89.79 | 72.16 | 672.2 | 43.5 | 25.59 | 175.7 | |
| P-value | | | 0.60 | 0.00 | | 0.10 | 0.00 | 0.00 | 0.18 | |
| CV1 | | | 96.6 | 6.7 | | 19.0 | 2.5 | 3.3 | 21.4 | |
| LSD(0.05 by t) | | | ns | 8.49 | | 180.3ns | 1.814 | 1.398 | ns | |

Seeddate: May 1, 2014 into tilled CC winter wheat stubble.

Weed Control Fall applied trifluralin (1 lb ai/a), pre-emerge 1 pt glyphosate.

Hand weed field pennycress. The fpcr competed with safflower prior to being controlled.

Fertilizer: 10-10-10-05 NPKS w/seed. Top dress 45 N as urea, post plant

Harvest: 14-Oct-14

Table 2 2014 Geraldine Spineless Safflower Cultivar Evaluations 147772
 Exp 14777201 Central Agricultural Research Center, Moccasin, Montana

| Code ID | Source | Entry | Flower | Plant | Seed | Test | Oil | Oil | Blossom color |
|-------------|-------------------------|-----------|-----------|-----------|-------------|-------------|-------------|------------|------------------|
| | | | 28-Jul | Ht Oct 14 | Yield | Weight | Content | Yield | |
| | | | % | cm | lbs/ac | lbs/bu | % | lbs/ac | |
| A302 | 11Saf01 | 18 | 25 | 87 | 1542 | 43.3 | 29.5 | 456 | Y YO |
| C14 | Red 3 S C14 | 1 | 40 | 78 | 1451 | 44.8 | 29.5 | 430 | Orange |
| C24 | C24 | 11 | 48 | 74 | 1411 | 43.5 | 26.8 | 377 | white |
| C21 | 4th S C21 | 8 | 41 | 81 | 1410 | 45.0 | 29.8 | 418 | Orange |
| C17 | 2013Sdpass53,54, | 4 | 39 | 79 | 1403 | 43.5 | 29.8 | 415 | Orange |
| A308 | 11Saf15 | 20 | 19 | 90 | 1391 | 44.3 | 29.0 | 402 | Y YO |
| A301 | 11Saf18 | 13 | 28 | 82 | 1321 | | | | Y YO |
| SaffD 11 | orange | 22 | 34 | 88 | 1315 | 43.5 | 30.8 | 403 | Orange |
| SaffD 13 | orange | 24 | 33 | 84 | 1303 | | | | YO O |
| C08 | Baldy47 N C8 | 12 | 58 | 79 | 1302 | 44.3 | 26.8 | 347 | white |
| SaffD 14 | orange | 25 | 39 | 81 | 1300 | 43.8 | 29.0 | 375 | YO Y |
| C23 | 2S C23 | 10 | 49 | 77 | 1297 | 43.8 | 27.0 | 349 | white |
| A304 | 11Saf21 | 19 | 21 | 84 | 1258 | | | | Y O |
| A311 | 11Saf11 | 15 | 31 | 85 | 1244 | 44.3 | 29.3 | 363 | YO O Y |
| A309 | 11Saf10 | 16 | 20 | 82 | 1228 | | | | Y YO |
| C19 | 5th S 105 C19 | 6 | 51 | 75 | 1210 | | | | white |
| C22 | 11th S C22 | 9 | 51 | 76 | 1189 | 43.3 | 27.3 | 321 | YW |
| SaffD 24 | ??? | 23 | 36 | 85 | 1176 | | | | Y O YO |
| A314 | 11Saf13 | 14 | 28 | 81 | 1172 | | | | O YO |
| A303 | 11Saf17 | 21 | 24 | 83 | 1170 | 43.5 | 29.0 | 341 | Y O YO |
| C20 | 12th S C20 | 7 | 51 | 77 | 1167 | | | | white |
| C15 | red 14 S C15 | 2 | 48 | 82 | 1152 | 44.3 | 29.0 | 333 | OY |
| A315 | 11Saf22 | 17 | 16 | 83 | 1141 | | | | Y O spined |
| C18 | Short 6S C18 | 5 | 34 | 81 | 1125 | | | | Orange |
| C16 | red 13 S C16 | 3 | 45 | 76 | 1107 | | | | OY |
| Mean | | | 36.3 | 80.9 | 1271 | 43.91 | 28.73 | 380.4 | |
| P-value | | | 0.00 | 0.00 | 0.08 | 0.76 | 0.00 | 0.04 | |
| CV 1 | | | 21.3 | 3.6 | 14.6 | 3.0 | 1.5 | 15.1 | |
| LSD(0.05 by | | | 10.86 | 6.077 | 261.8 | 1.89 | 0.6021 | 82.18 | |

Seed Date April 21, 2014 No-till CC into heavy winter wheat stubble. Stand variable.

Soil: 2" depth temp.: 11 C Moist Probe Depth: 19 inches.

Weed cotrol: Post plant 2 pints of pendimethalin in mix with glyphosate at 1.5 pt.

Hand weeded some kochia and wild oat.

Harvest: 24-Sep

Table 3 2014 CARC NTCC #2 Spineless Safflower Development Line Evaluations 1477702
 Exp 1477702 Central Agricultural Research Center, Moccasin, Montana

| Code ID | Source | | Flower | Plant | Seed | Test | Oil | Oil | Flower Color |
|----------------|-------------------|----------------------|-----------|---------|------------|-------------|-------------|------------|--------------------|
| | 2013 ID/plot | code | 5-Aug | Ht14Oct | Yield | Weight | Content | Yield | |
| | | | % | cm | lbs/ac | lbs/bu | % | lbs/ac | |
| 132SAF03 | SaffD 18 | 12saff4 404yl | 86 | 73 | 927 | | | | Y YO |
| 132SAF18 | B123 | B23 | 88 | 77 | 926 | 44.5 | 26.9 | 269 | YO OY |
| 132SAF10 | 124 13Pass73-75 | C24 | 95 | 71 | 914 | 45.5 | 25.0 | 230 | white |
| 132SAF01 | SaffD 12 | 12Saf2 | 83 | 77 | 892 | 44.5 | 27.5 | 244 | Y YO OY |
| 132SAF02 | SaffD 17 | 12saff4 404Orng | 80 | 74 | 858 | 43.8 | 27.5 | 236 | YO |
| 132SAF19 | A405 | 11Saf13 | 87 | 71 | 858 | 40.4 | 27.5 | 253 | YO Y |
| 132SAF12 | 12Saf2red | B126 | 92 | 74 | 855 | | | | OY YO * |
| 132SAF14 | 13sdpass41,42,43 | B15,C15,12-1277 | 93 | 71 | 851 | 42.5 | 28.9 | 251 | YO* |
| 132SAF21 | A403 | 11Saf18 | 78 | 73 | 849 | 44.3 | 26.5 | 228 | Y YO O |
| 132SAF07 | SE8strp 15 | C07 | 70 | 73 | 823 | 42.9 | 28.3 | 260 | Y YO |
| 132SAF06 | SaffD 22 | 12saff 2 22y | 79 | 76 | 821 | | | | YO |
| 132SAF15 | B103 | B03 | 94 | 67 | 820 | 42.9 | 27.8 | 209 | Y white |
| 132SAF11 | 119 13Pass59-61 | C19 | 94 | 70 | 817 | | | | white * |
| 132SAF13 | B109 | 2Saf4 401whiteflwrnS | 97 | 70 | 803 | | | | white |
| 132SAF17 | 13sdpass 53,54,55 | C17, B121 | 94 | 70 | 794 | 45.5 | 25.9 | 221 | O YO* |
| 132SAF23 | A413 | Saf3 | 75 | 78 | 791 | 41.9 | 28.2 | 206 | O Y YO spined toss |
| 132SAF22 | A410 | 11Saf22 | 74 | 73 | 757 | | | | Y yodd |
| 132SAF04 | SaffD 19 | 12saff 2 19y | 74 | 71 | 740 | | | | Y YO |
| 132SAF05 | SaffD 20 | 12saff 2 20y | 78 | 75 | 718 | | | | YO |
| 132SAF16 | B110 | B10 | 73 | 74 | 713 | | | | Yellow toss |
| 132SAF20 | A406 | 11Saf11 | 85 | 74 | 688 | | | | Y YO O |
| 132SAF24 | A411 | 11Saf01 | 39 | 71 | 596 | | | | Y YO O toss |
| 132SAF09 | 113 | C13 | 71 | 68 | 573 | | | | spined YO toss |
| 132SAF08 | 111 | C11 | 48 | 65 | 565 | | | | spined YO toss |
| Mean | | | 80.1 | 72.3 | 789.6 | 43.51 | 27.27 | 237.0 | |
| P-value | | | 0.00 | | 0.00 | 0.02 | 0.00 | 0.57 | |
| CV1 | | | 9.4 | | 16.9 | 3.6 | 3.0 | 14.8 | |
| LSD(0.05 by t) | | | 10.63 | | 188.2 | 2.657 | 1.384 | 59.78 | |

Seed date: 4/24/2014 CC in till wwht stubble, fall applied 1.0 ai. Trifluralin, post plant glyphosate.

Soil: Soil Temp. 2 Inch 5 C, probe depth 15 to 18"

Fertilizer: 10-10-10-5 w/seed, 45 N topdress as urea.

Weed control: Some weeding. In general the herbicides worked well in this trial.

TABLE 3. Montana Safflower Cultivar Evaluation Nursery Grown On-Station Under No-Till Dryland Fallow Conditions at Northern Agricultural Research Center. Havre, Montana. 2014. (Exp# 14-7702-SA)

| Entry | ENTRY | OIL TYPE | 1/ | | 2/ | | | | | | | |
|-----------------------|-----------------|----------|---------|-------------|-----------|----------------|---------------|----------------|---------|---------------|---------------|--------------------|
| | | | STAND % | PLANTS SqFt | FLWR DATE | PLNT HT Inches | YIELD Lbs/Ac | TEST WT Lbs/Bu | MOIST % | OIL % 0%Mois. | OIL % 8%Mois. | OIL Lbs/Ac 8%Mois. |
| 1 | 03B8069 | Linoleic | 73.5 | 3.4 | 202.7 | 25.1 | 1714.9 | 42.0 | 5.3 | 38.5 | 41.8 | 716.8 |
| 3 | 10B1233 | Linoleic | 82.0 | 4.0 | 203.3 | 25.4 | 939.5 | 37.9 | 4.6 | 43.7 | 47.4 | 445.9 |
| 22 | 10SC11 | Linoleic | 69.2 | 2.3 | 200.0 | 25.9 | 1732.3 | 47.2 | 5.5 | 26.8 | 29.2 | 505.7 |
| 20 | 11 Saff 21 | Linoleic | 69.1 | 2.9 | 203.0 | 26.9 | 1946.7 | 46.3 | 5.6 | 29.7 | 32.3 | 629.6 |
| 19 | Baldy Safflower | Linoleic | 62.2 | 2.7 | 200.0 | 27.0 | 1681.4 | 47.4 | 5.6 | 27.3 | 29.6 | 498.5 |
| 6 | Cardinal | Linoleic | 70.2 | 3.2 | 203.0 | 26.3 | 1802.3 | 44.2 | 5.5 | 37.2 | 40.5 | 729.6 |
| 7 | Finch | Linoleic | 67.7 | 3.0 | 201.7 | 25.4 | 1494.9 | 43.8 | 5.3 | 38.1 | 41.5 | 620.6 |
| 10 | Morlin | Linoleic | 63.2 | 3.4 | 204.0 | 23.7 | 1002.2 | 40.4 | 5.1 | 40.0 | 43.5 | 436.1 |
| 11 | NutraSaff | Linoleic | 74.0 | 3.4 | 201.0 | 25.1 | 434.6 | 36.8 | 4.3 | 48.6 | 52.8 | 229.3 |
| 21 | Saf 4-401 [C24] | Linoleic | 66.1 | 2.8 | 200.7 | 26.9 | 1639.0 | 47.6 | 5.6 | 26.9 | 29.3 | 480.7 |
| 2 | 06B3172 | Oleic | 72.5 | 2.9 | 203.3 | 25.3 | 1647.9 | 39.8 | 5.1 | 40.8 | 44.3 | 730.1 |
| 4 | 10B6015 | Oleic | 68.5 | 3.0 | 205.0 | 25.2 | 1382.9 | 42.4 | 5.2 | 37.9 | 41.1 | 568.6 |
| 5 | 10B7451 | Oleic | 78.8 | 4.0 | 201.3 | 24.6 | 1083.0 | 37.8 | 4.6 | 44.0 | 47.9 | 518.1 |
| 17 | Hybrid 1601 | Oleic | 75.7 | 2.9 | 201.7 | 27.5 | 1279.8 | 37.2 | 4.9 | 40.1 | 43.6 | 558.0 |
| 13 | Hybrid 200 | Oleic | 65.7 | 2.9 | 202.7 | 25.4 | 2008.0 | 44.0 | 5.5 | 33.7 | 36.6 | 734.6 |
| 14 | Hybrid 446 | Oleic | 61.2 | 2.2 | 202.7 | 25.6 | 1831.0 | 43.3 | 5.5 | 34.1 | 37.0 | 678.9 |
| 15 | Hybrid 528 | Oleic | 58.3 | 2.3 | 203.7 | 23.9 | 1313.2 | 32.6 | 4.6 | 44.3 | 48.2 | 632.6 |
| 16 | Hybrid 621 | Oleic | 64.8 | 2.5 | 202.3 | 25.6 | 1240.6 | 37.4 | 4.7 | 42.6 | 46.3 | 575.1 |
| 18 | Hybrid 9049 | Oleic | 67.3 | 3.6 | 200.7 | 26.5 | 1988.1 | 44.1 | 5.4 | 32.5 | 35.3 | 701.3 |
| 8 | MonDak | Oleic | 64.4 | 2.8 | 204.0 | 24.8 | 1303.1 | 42.5 | 5.2 | 37.1 | 40.3 | 525.7 |
| 9 | Montola 2003 | Oleic | 72.1 | 3.3 | 204.7 | 23.5 | 1219.5 | 41.8 | 5.1 | 39.3 | 42.7 | 521.0 |
| 12 | STI 1201 | Oleic | 69.2 | 4.4 | 203.7 | 22.4 | 1318.1 | 37.3 | 4.6 | 44.5 | 48.4 | 637.5 |
| EXPERIMENTAL MEANS | | | 68.9 | 3.1 | 202.5 | 25.4 | 1454.7 | 41.5 | 5.1 | 37.6 | 40.9 | 576.1 |
| LSD (0.05) | | | 11.8 | 0.9 | 1.3 | 1.6 | 275.8 | 0.9 | 0.2 | 1.4 | 1.4 | 11.6 |
| C.V.: (S / MEAN)*100 | | | 10.4 | 17.5 | 0.4 | 3.8 | 11.5 | 1.3 | 1.8 | 0.9 | 0.9 | 110.4 |
| P-VALUE (Entries) | | | 0.0 | 0.0005 | <.0001 | <.0001 | <.0001 | <.0001 | <.0001 | <.0001 | <.0001 | <.0001 |

Bold Indicates highest yielding entry based on Fisher's Protected LSD at the 0.05 probability level.

Bold Indicates cultivars yielding equal to the highest yielding entry based on Fisher's Protected LSD at the 0.05 probability level.

1/ No. Days from January 1 (202 = July 21)

2/ Volumetric yields are based on plot weights adjusted to uniform 8 percent grain moisture.

NutraSaff had a reduced yield due to bird feeding late in the season.

TABLE 4. Montana Safflower Cultivar Evaluation Nursery Grown On-Station Under No-Till Dryland Fallow Conditions at Northern Agricultural Research Center. Havre, Montana. 2013. (Exp# 13-7702-SA)

| Entry | ENTRY | OIL TYPE | STAND % | 1/ | | | 2/ | | | | | |
|-----------------------|------------------------|-----------------|-------------|--------------|----------------|-------------|---------------|----------------|------------|---------------|---------------|--------------------|
| | | | | FLWR DATE | PLNT HT Inches | SHATTER % | YIELD Lbs/Ac | TEST WT Lbs/Bu | MOIST % | OIL % 0%Mois. | OIL % 8%Mois. | OIL Lbs/Ac 8%Mois. |
| 1 | 00B1597-3 | Linoleic | 93.6 | 206.3 | 28.0 | 15.0 | 1693.8 | 44.3 | 6.9 | 41.1 | 44.7 | 757.4 |
| 2 | 03B8069 | Linoleic | 92.3 | 204.7 | 21.0 | 18.3 | 1935.5 | 44.5 | 6.9 | 40.8 | 44.3 | 855.9 |
| 4 | 05B3401 | Linoleic | 89.7 | 205.7 | 22.9 | 5.3 | 1374.3 | 38.5 | 6.5 | 44.9 | 48.8 | 671.2 |
| 5 | 06B1044 | Linoleic | 90.6 | 207.7 | 26.0 | 15.0 | 1663.7 | 40.9 | 6.9 | 40.6 | 44.1 | 735.7 |
| 7 | 08B1008 | Linoleic | 92.5 | 206.7 | 26.6 | 5.0 | 1685.7 | 38.9 | 6.5 | 45.5 | 49.5 | 833.8 |
| 9 | 10B1186 | Linoleic | 85.9 | 206.0 | 26.1 | 5.0 | 1905.8 | 39.0 | 6.3 | 45.7 | 49.7 | 947.0 |
| 10 | 10B1233 | Linoleic | 88.7 | 205.3 | 25.4 | 8.3 | 1853.3 | 38.7 | 6.2 | 46.9 | 51.0 | 944.9 |
| 11 | 10B1334 | Linoleic | 91.8 | 204.7 | 25.6 | 11.7 | 1725.6 | 41.0 | 6.8 | 44.5 | 48.3 | 834.1 |
| 12 | 10B1357 | Linoleic | 94.1 | 205.7 | 27.8 | 12.3 | 1683.9 | 41.7 | 6.9 | 43.2 | 46.9 | 791.1 |
| 15 | 10B6803 | Linoleic | 93.7 | 203.3 | 27.6 | 16.7 | 1831.9 | 45.5 | 6.9 | 39.7 | 43.2 | 791.4 |
| 21 | World Bulk | Linoleic | 92.5 | 208.0 | 33.0 | 21.7 | 1622.0 | 47.4 | 7.3 | 31.4 | 34.1 | 553.0 |
| 22 | Cardinal | Linoleic | 95.7 | 205.7 | 29.7 | 20.0 | 1721.0 | 45.4 | 7.0 | 39.3 | 42.7 | 734.5 |
| 24 | Finch | Linoleic | 89.1 | 203.7 | 25.2 | 5.3 | 1565.7 | 46.3 | 7.0 | 39.1 | 42.5 | 666.0 |
| 25 | NutraSaff | Linoleic | 91.8 | 205.3 | 25.4 | 1.0 | 1288.9 | 38.1 | 5.9 | 52.5 | 57.1 | 736.8 |
| 27 | Morlin | Linoleic | 92.3 | 207.3 | 20.9 | 3.7 | 1828.3 | 40.1 | 6.5 | 43.6 | 47.3 | 865.1 |
| 33 | Baldy | Linoleic | 94.4 | 202.7 | 26.9 | 11.7 | 1500.2 | 48.2 | 7.1 | 27.6 | 30.0 | 450.5 |
| 34 | Crescent | Linoleic | 90.9 | 206.7 | 31.2 | 25.0 | 981.9 | 44.1 | 7.1 | 35.1 | 38.2 | 375.9 |
| 35 | Saff4-401 [C24] | Linoleic | 96.0 | 203.7 | 23.0 | 10.3 | 1427.0 | 47.9 | 7.2 | 27.1 | 29.4 | 421.7 |
| 36 | 11 Saff 21 | Linoleic | 97.6 | 201.3 | 27.0 | 13.3 | 1668.9 | 47.4 | 7.2 | 30.7 | 33.3 | 556.1 |
| 3 | 04B7563 | Oleic | 88.2 | 207.7 | 23.0 | 15.0 | 1806.9 | 43.1 | 6.8 | 39.0 | 42.3 | 765.5 |
| 6 | 06B3172 | Oleic | 86.7 | 204.0 | 23.6 | 5.3 | 1721.7 | 41.5 | 6.7 | 42.1 | 45.8 | 789.4 |
| 8 | 08B6146 | Oleic | 89.5 | 202.3 | 21.0 | 2.3 | 1646.2 | 39.2 | 6.3 | 46.4 | 50.4 | 830.6 |
| 13 | 10B6005 | Oleic | 86.2 | 204.0 | 25.1 | 15.0 | 1672.9 | 42.8 | 6.9 | 39.5 | 43.0 | 719.3 |
| 14 | 10B6015 | Oleic | 91.3 | 206.7 | 22.4 | 7.0 | 1767.0 | 43.8 | 6.8 | 39.3 | 42.8 | 756.0 |
| 16 | 10B7451 | Oleic | 96.7 | 201.7 | 20.5 | 3.7 | 1682.9 | 38.7 | 6.1 | 46.5 | 50.5 | 849.4 |
| 17 | Hybrid 200 | Oleic | 79.4 | 204.7 | 24.1 | 8.3 | 1866.4 | 44.6 | 7.0 | 35.4 | 38.5 | 719.5 |
| 18 | Hybrid 528 | Oleic | 74.9 | 202.7 | 23.2 | 2.3 | 1721.4 | 34.8 | 6.4 | 48.4 | 52.6 | 904.8 |
| 19 | Hybrid 621 | Oleic | 83.0 | 207.3 | 24.4 | 3.7 | 1620.2 | 38.1 | 6.6 | 45.2 | 49.1 | 798.3 |
| 20 | STI 1201 | Oleic | 95.2 | 204.3 | 21.1 | 1.0 | 1882.2 | 37.6 | 6.3 | 48.8 | 53.1 | 999.2 |
| 23 | MonDak | Oleic | 85.3 | 206.0 | 23.7 | 8.7 | 1814.0 | 44.3 | 7.0 | 39.8 | 43.3 | 786.0 |
| 26 | Montola 2003 | Oleic | 94.7 | 205.3 | 21.8 | 11.7 | 1931.6 | 43.9 | 6.8 | 41.5 | 45.1 | 871.7 |
| 28 | Hybrid 1601 | Oleic | 90.1 | 204.7 | 23.8 | 8.7 | 1588.1 | 37.8 | 6.5 | 43.4 | 47.2 | 753.9 |
| 29 | Hybrid 9049 | Oleic | 87.4 | 201.0 | 23.8 | 8.3 | 1815.9 | 44.3 | 7.0 | 34.1 | 37.1 | 673.1 |
| 30 | Hybrid 446 | Oleic | 75.9 | 203.3 | 26.2 | 10.0 | 1947.0 | 44.2 | 6.9 | 36.4 | 39.5 | 769.9 |
| 31 | CW 3268 | Oleic | 96.2 | 204.3 | 24.7 | 6.7 | 1768.2 | 44.4 | 6.7 | 42.2 | 45.9 | 813.4 |
| 32 | CW 1221 | Oleic | 89.3 | 201.7 | 24.8 | 4.0 | 2039.1 | 40.2 | 6.6 | 46.0 | 50.0 | 1015.0 |
| EXPERIMENTAL MEANS | | | 90.1 | 204.8 | 24.9 | 9.6 | 1701.4 | 42.3 | 6.7 | 40.9 | 44.5 | 759.4 |
| LSD (0.05) | | | 7.7 | 3.4 | 3.5 | 8.2 | 314.0 | 1.1 | 0.3 | 2.0 | 2.2 | 153.3 |
| C.V.: (S / MEAN)*100 | | | 5.3 | 1.0 | 8.7 | 52.2 | 11.3 | 1.5 | 2.5 | 3.0 | 3.0 | 12.4 |
| P-VALUE (Entries) | | | <.0001 | 0.0006 | <.0001 | <.0001 | <.0001 | <.0001 | <.0001 | <.0001 | <.0001 | <.0001 |

Bold Indicates cultivars yielding equal to the highest yielding entry based on Fisher's Protected LSD at the 0.05 probability level.

1/ No. Days from January 1 (205 = July 22)

2/ Volumetric yields are based on plot weights adjusted to uniform 8 percent grain moisture.

Safflower narrative:

Safflower, a deep rooting warm season oilseed crop, has been produced commercially in Montana and the Northern Great Plains for over 50 years. It is generally recommended that

safflower be grown at elevations of 3000 ft., or lower, to insure the crop consistently receives sufficient heat units to fill the safflower seed. However, some commercial producers whose land lies at elevations in 3000 to 3500 ft elevation have extended history of raising safflower. Though their safflower seed yields tend to be somewhat less than grown in warmer conditions. Safflower's greater rooting depth and higher water use make it a suitable tool in managing some saline seeps associated with annual cropping systems.

Safflower has a wide range of genetic variability for, seed coat color and thickness, blossom colors and leaf types. White is the most prominent seed coat color. Yellow and yellow-red are most frequent flower color. Most prominent commercial varieties have lance shaped leaves with numerous spines along the margins of leaves and bracts. Higher seed yields and higher oil content, along with less insect damage, are characters associated with spined type safflower versus reduced spines or spineless safflower.

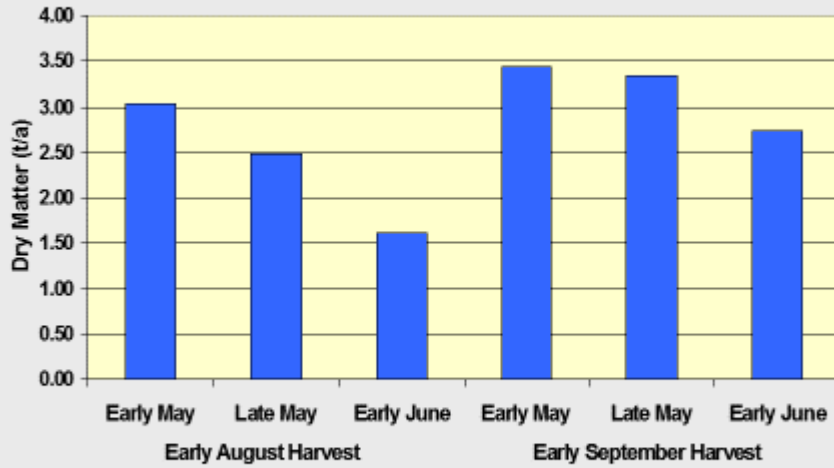
Through various events, and some research observations, it is known that cattle will readily consume safflower plants, in spite of the spines. In some case preferring safflower over alfalfa hay. The cool growing season of 1991 and 1992, resulted in thousands of acres of safflower have deficient heat unit accumulation and thus empty seeds. While the safflower crop was total loss for some, other producers swathed, baled and fed the crop residue. Others let their cattle graze standing safflower through the fall. See illustrations at end

In 1987, the Sidney world collection of safflower seed was planted at the Central Agricultural Research Center with the purpose of developing a safflower population adapted to the cooler shorter growing season typical of the 4,300 elevation of the CARC. Later, Partial Hull, safflower line with some mechanical male sterility was introduced to the population with the objective to increase out crossing. Partial Hull has an orange red flower and a degree of dwarf variants (hts. of 3 to 6 inches). Early flowering and spineless plants were harvested separately starting in the mid- 1990s. Early spineless selections generally had smaller bolls and very low seed yields. Overtime spineless plants with larger bolls and more leaves were selected. In 2009, three spineless white flowered plants were observed as contaminates in two of the white flower entries of the Montana uniform oilseed safflower trial [lines 02B2108 2 plants and 07B6567 1 plant] and added to the seed increase and evaluation trials. Illustrations 1, 2 and 3 display the yield and quality results obtained safflower for forage evaluations conducted in the mid- 1990s.

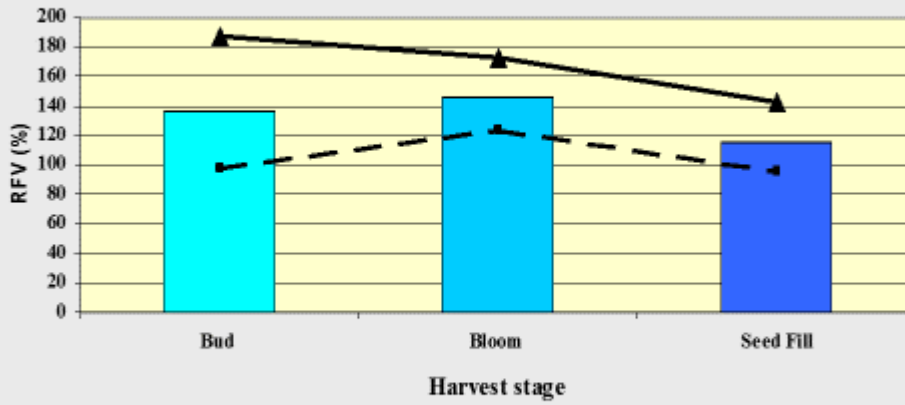
MSU Range Scientist, Dr. Clayton Marlow evaluated safflower as a component of upland game bird food and shelter in the Roy area. Safflower was found to provide excellent shelter and food for partridge. Mule deer, at the CARC have found the spineless safflower to provide both food and shelter. Photo: shows mule deer grazing on safflower bolls and leaves at the CARC.



**1995 Effect of seeding and harvest date on safflower yield.
(Averaged across 7 locations)**



The mean relative feed value of safflower forage produced in high, moderate and low yield environments.



Planting date and harvest date effect on safflower yield in high yield environments.

