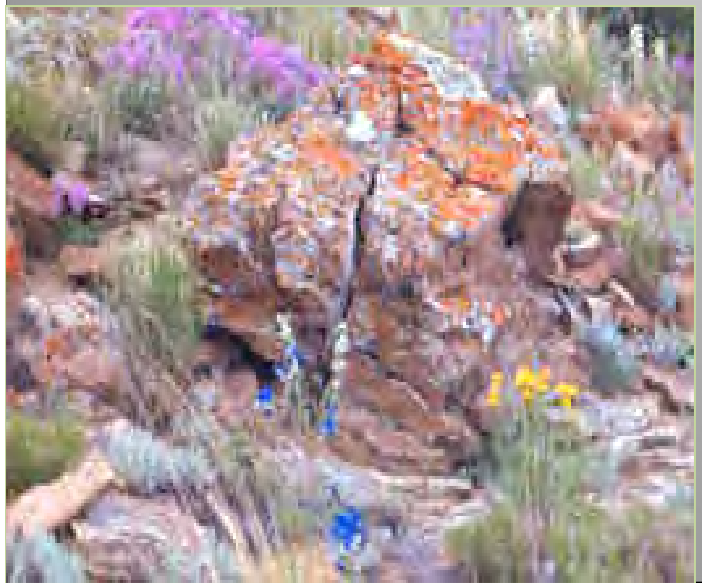
Harvestability Indexes for Native Wildflowers and Grasses



Mark Majerus and Lee Arbuckle

Native Seedsters, Inc.

Billings, Montana

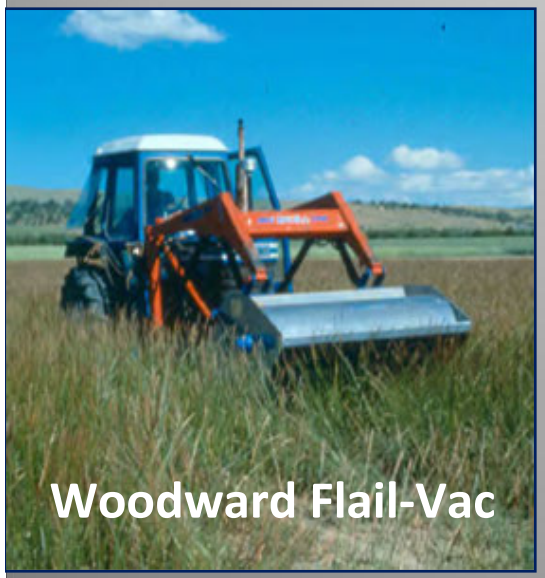
Seed Harvesting of Native Plants

Swath/Cure/Combine

Direct Combine

Native Seedster

Shelbourne Header


Woodward Flail-Vac

Prairie Habitat-pull type

Hand Harvest

Developing Harvestability Indexes

♦388 native wildflower species
195 native grass species
(commercially produced or wildland collected) US and Canada

♦ Funded by: Montana Board of Research & Commercialization Technology

♦ Wildflowers 13- Grasses 9 morphological & physiological characteristics

♦ Consulted w/ professional seed producers & collectors

♦ Ranking of whether characteristics have a
(+) favorable impact
(-) limiting impact

♦ Index for Standard Combine harvest
♦ Index for Native Seedster harvest

Wildflower Harvestability Index

Plant Growth Form

	Combine	Seedster
upright	+30	+30
decumbent	-10	-10
creeping/vine	-20	-20

Plant Height

	Combine	Seedster
tall--> 3’	+10	+20
mid--1.5’ to 3’	+20	+20
short-- 1’ to 1.5’	-20	-20
very short-- 1’	-40	-40

Foliage Density

	Combine	Seedster
sparse	+10	+10
medium	+5	+5
thick	-10	-10

Type of Inflorescence

	Combine	Seedster
spike	+10	+10
raceme	+10	+10
panicle	+10	+10
umbel/corymb/cyme	+10	+10
solitary head	+10	+10
recessed in receptacle	+20	-10

Inflorescence Position in Relation to Forage

	Combine	Seedster
well above	+20	+20
terminal	+10	+10
in foliage	-10	-10
axillary	-20	-20

Flowering & Ripening Uniformity

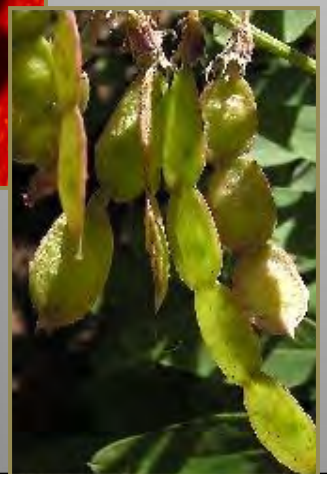
	Combine	Seedster
very uniform	+30	+30
3-7 days	+10	+10
7-14 days	-10	+10
14+ days	-20	+10

Tendency to Shatter

	Combine	Seedster
none	+30	+10
slight	+10	+10
moderate	-10	-10
severe	-30	-30

Container Type

	Combine	Seedster
capsule/loment	+20	+20
pod/silique/follicle/nutlet	+10	+10
recessed in receptacle	+20	-10
not contained	0	+10

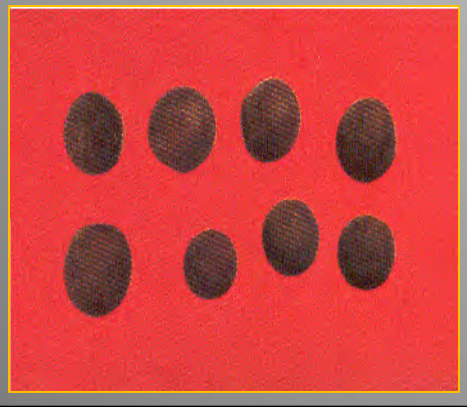


Container Integrity

	Combine	Seedster
strong	+20	-10
moderate	+10	+10
fragile	-10	-5
explosive	-20	-20

Seed Type

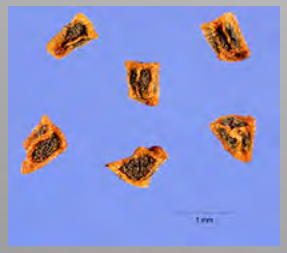
	Combine	Seedster
seed	+10	+10
achene	+10	+10
mericarp	+5	+5



Seed Size

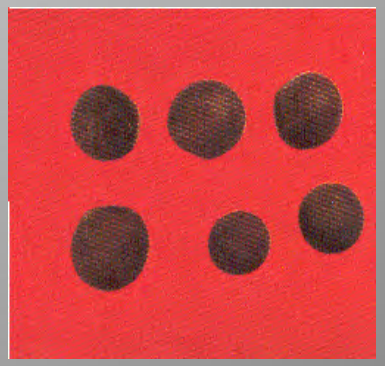
	Combine	Seedster
very small >1,000,000/lb.	-10	+5
small 200,000 to 1,000,000	0	+5
medium 80,000 to 200,000	+5	+5
large <80,000	+10	+5

Epilobium
3,000,000



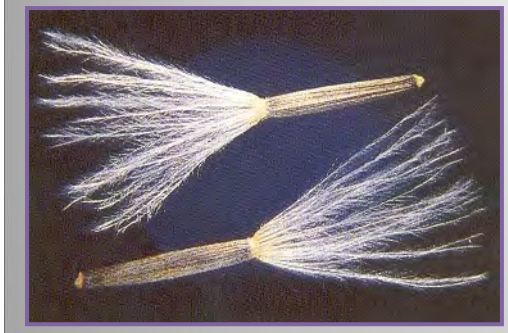
Penstemon
400,000

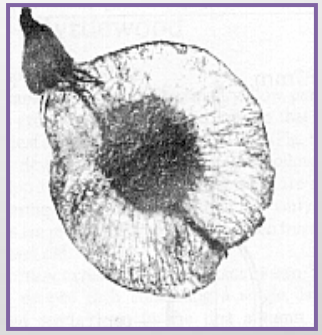
Asclepias
120,000



Vicia
33,000

Seed & Container Appendages

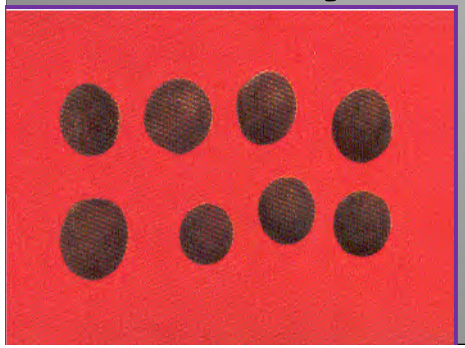


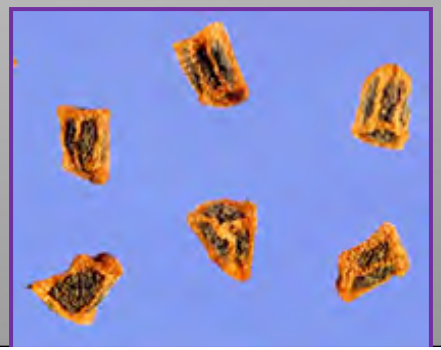


		Combine	Seedster
hair/bristle pappus			
scales/awns/wings	minute	-5	+5
	0.5-1 X	-5	+5
	2-3 X	-10	+10
	>3 X	-15	+10
hooks/barbs		-5	+5
hairs		-5	+5
none		+20	+5

Seed Surface/Flowability

	Combine	Seedster
smooth	+10	+10
hairy	-10	-10
ridged/deep nerved	-10	-10
angular	-5	-5
nerved/striate/wrinkled	-5	-5
wooly	-20	-20





Harvestability Indexes

Indexes ranged from -65 to +195

Groupings:

< +40 considered difficult to harvest

45 to 100 moderate harvestability

105 to 140 easy to harvest

> 145 considered very easy to harvest

Index Comparisons

Combine:

- **difficult--17%**
- **moderate--46%**
- **easy--26%**
- **very easy--11%**

Seedster:

- **difficult--10%**
- **moderate--41%**
- **easy--46%**
- **very easy--3%**

Index Examples

Apiaceae family	combine	Seedster
snow parsley	75	105
Nuttall desert parsley	35	60
cow parsnip	60	105
Fabaceae family		
leadplant	175	110
groundplum	15	-10
Illinois bundleflower	110	105
riverbank lupine	95	95

Index Examples

	combine	Seedster
Asteraceae family		
western yarrow	85	125
Maximilian sunflower	145	70
prairie coneflower	105	90
northern goldenrod	65	120
New England aster	55	130
Onograceae family		
willow herb	40	110
evening primrose	100	140

Index Examples

Ranunculaceae family	combine	Seedster
tall thimbleweed	45	85
monkshood	135	110
golden columbine	120	135
Scrophulariaceae family		
smooth penstemon	145	120
scarlet Indian paintbrush	95	115

Seedster w/ higher Index on 56% of species

Seedster Advantage-

- ♦ extended ripening period
  - -opportunity for multiple harvest
- ♦ Seed appendages
  - -difficult to glean through sieves of combine
  - -more easily pulled into Seedster

Combine Advantage-

- ♦ strongly attached and tough seed containers
  - -seed containers that require additional threshing action of cylinder/concave

Difficult for both Combine and Seedster

- ♦ short stature and readily shatter

Grass Harvestability Index

Plant Height

	Combine	Seedster
tall--> 3’	+10	+20
mid--1.5’ to 3’	+20	+20
short-- 1’ to 1.5’	-10	-10
very short-- 1’	-20	-30

Type of Inflorescence

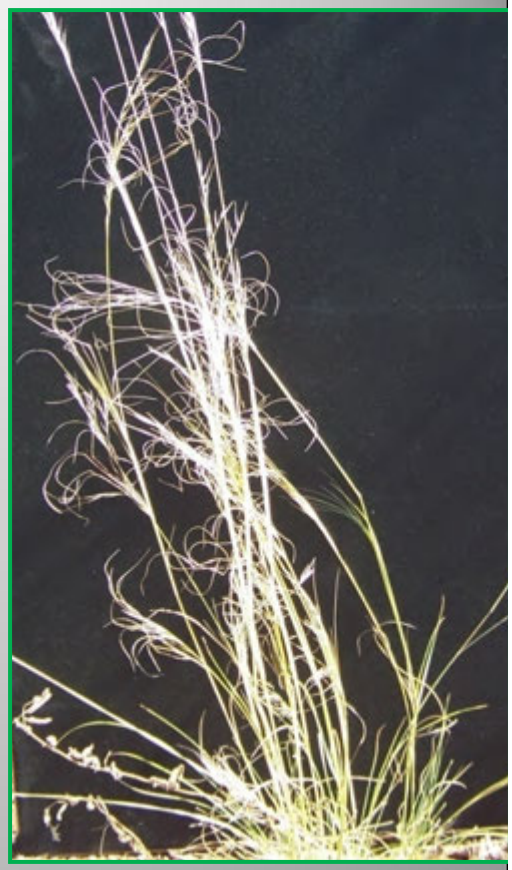
	Combine	Seedster
spike	+20	+10
raceme (open)	+10	+10
raceme (tight)	+20	-20
panicle (narrow)	+20	+10
panicle (open)	+20	+20
panicle (diffuse)	+20	+10

Inflorescence Position in Relation to Foliage

	Combine	Seedster
well above	+20	+20
terminal	+10	+10
in foliage	-10	-20

Foliage Density

	Combine	Seedster
sparse	+10	+10
medium	+5	+5
thick	-5	-10
basal	+20	+20



Tendency to Shatter

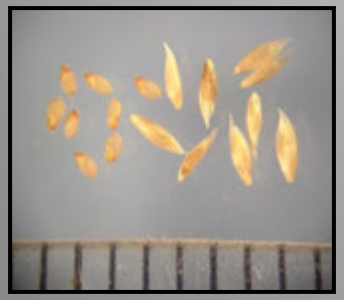
	Combine	Seedster
none	+30	-10
slight	+20	+10
moderate	0	+10
severe	-10	-10
extreme	-30	-20

Flowering & Ripening Uniformity

	Combine	Seedster
3-7 days	+10	+10
7-10 days	0	+10
10+ days	-10	+10

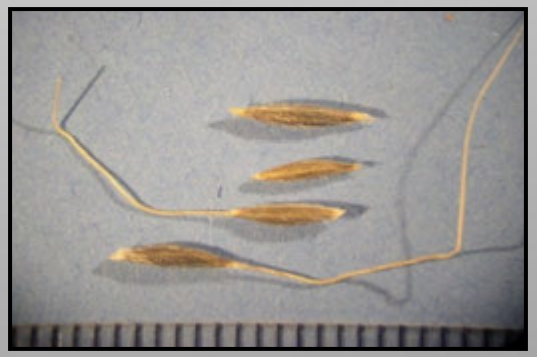
Seed Size

	Combine	Seedster
very small >1,000,000/lb.	0	+10
small 200,000 to 1,000,000	+5	+10
medium 80,000 to 200,000	+10	+10
large <80,000	+10	0



Sporobolus
5,000,000

Panicum
389,000

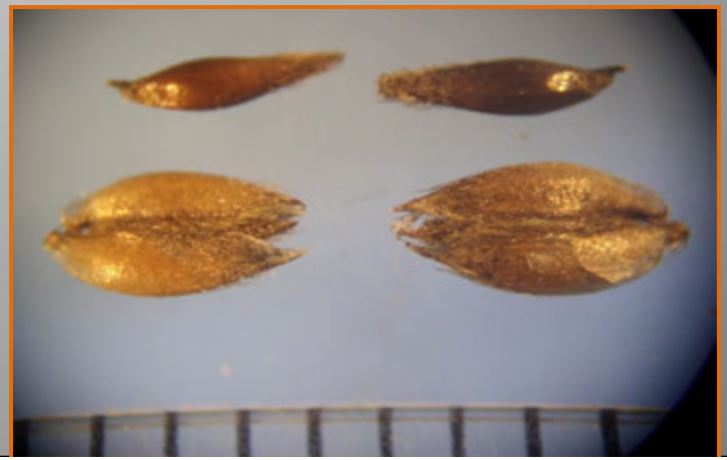


Nassella
186,000

Bouteloua
48,000

Seed Shape

	Combine	Seedster
elongate	+10	+10
ellipsoid	+10	+10
ovoid	+5	+5
Irregular	+5	+10



Seed Appendages

	Combine	Seedster
awns – tipped	+10	+5
0.5-1 X	-5	+5
2-3 X	-10	+10
>3 X	-15	+10
pubescence	0	+5
callus hairs	-10	+10
sterile florets	-5	+10
multiples (awns, hairs, florets)	-20	+30
none	+20	0

Harvestability Indexes

Indexes ranged from 5 to 140

Groupings:

< 55 considered difficult to harvest

60 to 100 moderate harvestability

> 105 considered easy to harvest

Index Comparisons

Combine:

- difficult--16%
- moderate--51%
- easy--33%

Seedster:

- difficult--7%
- moderate--58%
- easy--35%

Index Examples

Aveneae tribe	Combine	Seedster
rough bentgrass	75	95
alpine timothy	95	65
spike trisetum	90	110
Poeae tribe		
Idaho fescue	90	105
tufted hairgrass	105	115
Sandberg bluegrass	100	90

Index Examples

Stipeae tribe	Combine	Seedster
needle & thread	55	110
green needlegrass	35	90
red threeawn	70	110
Triticeae tribe		
blue wildrye	55	100
bluebunch wheatgrass	70	80
bottlebrush squirreltail	5	50

Index Examples

Paniceae tribe	Combine	Seedster
switchgrass	65	65
seashore paspalum	100	70
Andropodeae tribe		
big bluestem	45	80
little bluestem	75	100
Indiangrass	100	120

Seedster w/ higher Index on 55% of species

Seedster Advantage-

- ♦ extended ripening period
  - -opportunity for multiple harvest
- ♦ Seed appendages (awns, hairs, sterile florets)
  - -difficult to glean through sieves of combine
  - -more easily pulled into Seedster

Combine Advantage-

- ♦ strongly attached and tough inflorescence
  - -inflorescences that require additional threshing action of cylinder/concave

Difficult for both Combine and Seedster

- ♦ short stature and readily shatter

Wildflower Harvestability Indexes-388 species

Native Grass Harvestability Indexes-195 species

Are now accessible at:

www.NativeSeedsters.com