What's New with Specialty Seeds and Grains?

Steve Zwinger, Theresa Podoll, Frank Kutka

NPSAS FBC Co-coordinators

And other members of the Value Added Organic Grains Project from around the country

Sponsored by
USDA Organic Research and Extension Initiative and SARE

Buckwheat

FBC Buckwheat Project

FBC Buckwheat Project

Buckwheat varieties Devyatka and Dikyul (ДЕВЯТКА and ДИКУЛЬ) were bred at the All-Russia Research Institute of Legumes and Groat Crops by N. V. Fesenko, et al.

Growth is determinate. Flower buds and flowers are white-pink. Mid-ripening. Vegetation period is 83-95 days.
Advantage of the varieties is simultaneous blossom and ripening, increased resistance to spring cold and droughts, high productivity. Weight of 1000 grains is 30-36 g. Uniformity and grain quality are high.

Amaranth – Glenn Philbrick

Quinoa

Quinoa

Suggestions for Quinoa

- Select varieties that fit your climate.
  - “Red Head” resists sprouting west of the Cascades
  - “Colorado 407D” tolerates heat east of the Cascades; Glenn Philbrick likes Cherry Vanilla
  - Kevin Murphy at WSU is putting out F3 seed of new crosses this summer
- Modify your planters for extremely small seed. May need to drill solid plates.

Other big impediment for quinoa is processing

NPSAS/Pulse USA Field Pea Variety Trial

NDSU Carrington Research Extension Center
2013 Variety Trial Data

Field Pea - Organic — **Carrington**

Variety	Days to Bloom	Bloom Duration	Days to PM	Plant Height 1[1] inch	Plant Height 2[2] inch	Plant Lodge 0-9	1000 KWT gram	Seeds/ Pound	Seed Protein %	Test Weight lb/bu	Seed Yield 2013 bu/ac	Seed Yield 3-yr. Avg. bu/ac
Abarth	48.3	10.7	75.6	22.9	21.2	3.6	244.4	1857	24.0	64.6	37.4	--
Agassiz	50.5	12.0	82.0	26.5	22.6	1.5	236.2	1924	24.3	64.7	50.3	50.9
Blusmoon	51.5	6.5	81.0	24.0	21.6	3.0	227.4	1998	24.6	64.9	43.9	--
CDC Meadow	50.5	11.3	78.8	24.5	19.4	3.8	202.8	2240	23.9	65.4	48.8	--
CDC Striker	52.0	8.5	82.0	24.4	22.9	1.5	240.7	1887	26.2	65.0	41.6	49.3
Cruiser	50.0	9.0	76.3	22.9	19.6	3.3	197.3	2308	25.7	64.4	44.3	42.0
DS Admiral	50.0	8.0	78.8	25.0	23.7	1.5	232.4	1956	24.6	65.5	41.9	45.6
Majoret	51.3	9.4	83.0	24.8	22.8	1.8	236.7	1919	25.6	64.9	46.8	47.5
Matrix	54.3	7.5	84.5	22.8	21.3	2.5	274.2	1658	22.2	64.5	32.5	--
Miami	51.3	9.5	81.3	22.2	19.8	2.0	226.3	2009	24.0	63.7	31.3	--
PUSA 11001-2	46.5	11.0	72.8	23.2	22.2	0.5	227.7	1994	25.2	65.2	47.5	--
PUSA 11002	48.3	10.7	76.6	22.8	18.0	4.6	218.7	2079	27.0	65.6	40.3	--
PUSA 11003	50.0	8.8	78.3	24.5	20.1	3.0	220.4	2062	25.0	65.3	52.4	--
PUSA 11011	46.3	13.4	77.0	26.7	22.8	2.3	216.1	2103	26.2	64.9	38.1	--
PUSA 12001	51.5	9.0	82.3	26.6	25.2	1.3	244.1	1863	26.3	64.4	51.3	--
PUSA 12002	52.0	8.8	82.8	24.9	23.9	0.5	243.7	1865	23.9	64.4	48.3	--
PUSA EXP1300	49.0	10.0	80.3	26.0	26.1	0.0	261.5	1738	26.3	65.1	41.7	--
PUSA EXP1301	48.3	10.5	78.8	26.6	25.1	0.5	216.9	2095	26.2	64.4	40.5	--
PUSA EXP 312	48.0	11.0	80.6	28.4	25.9	0.0	233.9	1941	25.3	64.8	51.5	--
PUSA EXP512	50.0	10.0	81.6	26.1	23.4	1.9	247.4	1838	23.7	64.5	59.9	--
PUSA EXP612	48.5	8.9	75.6	27.7	24.3	0.9	248.7	1827	24.6	65.0	52.5	--
Shamrock	53.0	9.3	84.3	25.8	24.0	1.3	238.3	1906	23.6	64.9	51.4	--
Spider	51.8	11.3	83.8	24.9	22.8	1.0	247.9	1831	26.3	63.9	34.4	47.5
Mean	50.3	9.7	80.2	25	22.5	1.8	233.3	1959	25	64.8	45.5	--
C.V. (%)	1.2	13	2.9	6.5	8.1	61.2	3.5	3.6	4	0.9	16.1	--
LSD 0.10	0.7	1.5	2.7	1.9	2.2	1.3	9.8	83	1.2	0.7	8.7	--

Planting Date = May 10; Harvest Date = August 8; Previous Crop = Spring Wheat

[1] Plant height 1 taken July 19 at end bloom.

[2] Plant height 2 taken at harvest.

Variety Name	Emerge	Vigor	Det/Ind	Erect?	July Canopy Rating	**Canopy Height**	Flower	Days 80%	Maturity	**Yield lb/A**	**Yield Rank**
221731	10.0	3.2	1.67	1.00	2.17	**49**	56.5	90.0	15.3	**840**	**15**
257463	8.8	3.7	1.67	1.00	2.00	**46**	58.7	86.5	8.7	**900**	**14**
292904	8.5	3.2	1.33	1.67	3.17	**43**	64.8	88.7	14.2	**1143**	**12**
292908	8.0	2.9	1.67	1.67	2.83	**38**	57.0	84.7	4.3	**1091**	**14**
293499	8.0	4.0	1.33	1.67	3.00	**40**	64.8	88.5	14.2	**1490**	**4**
293525	9.3	3.2	2.00	2.00	2.50	**42**	63.0	87.7	8.0	**1418**	**6**
293527	11.9	1.7	1.67	1.67	3.00	**40**	68.7	94.2	14.2	**918**	**14**
293570	7.2	4.7	2.00	2.00	3.50	**54**	63.2	89.0	12.5	**1370**	**6**
339623	7.8	3.3	2.00	1.50	3.00	**44**	67.0	85.2	9.2	**1230**	**8**
352903	7.5	2.2	1.33	2.00	2.83	**46**	63.2	88.0	9.8	**1579**	**4**
354699	8.8	3.2	1.67	1.33	2.67	**44**	66.3	88.3	11.3	**1141**	**12**
367860	7.5	1.8	2.00	1.00	2.50	**41**	63.5	88.0	13.2	**1170**	**10**
427075	7.9	2.0	1.33	1.00	2.00	**38**	58.2	82.2	1.5	**1049**	**13**
491446	8.9	3.0	1.67	1.00	3.33	**46**	57.2	88.2	14.2	**1279**	**8**
491468	8.0	3.5	1.67	1.83	3.00	**37**	62.5	86.0	6.2	**1153**	**12**
491484	8.0	2.5	1.00	1.00	3.17	**49**	61.2	92.5	16.0	**822**	**16**
Ca46	10.0	2.7	1.00	1.33	3.33	**50**	68.5	112.7	16.0	**1375**	**5**
Iron&Clay	9.2	2.9	2.00	1.67	3.00	**53**	.	.	21.0	**.**	**21**
MN	8.8	3.0	1.67	1.00	2.17	**41**	56.2	84.5	5.5	**1066**	**14**
Palapye	8.0	2.9	2.00	2.00	2.67	**46**	72.0	89.7	13.3	**1352**	**7**
Sunapee	10.0	2.4	1.67	1.00	2.00	**40**	54.5	83.7	2.5	**942**	**16**

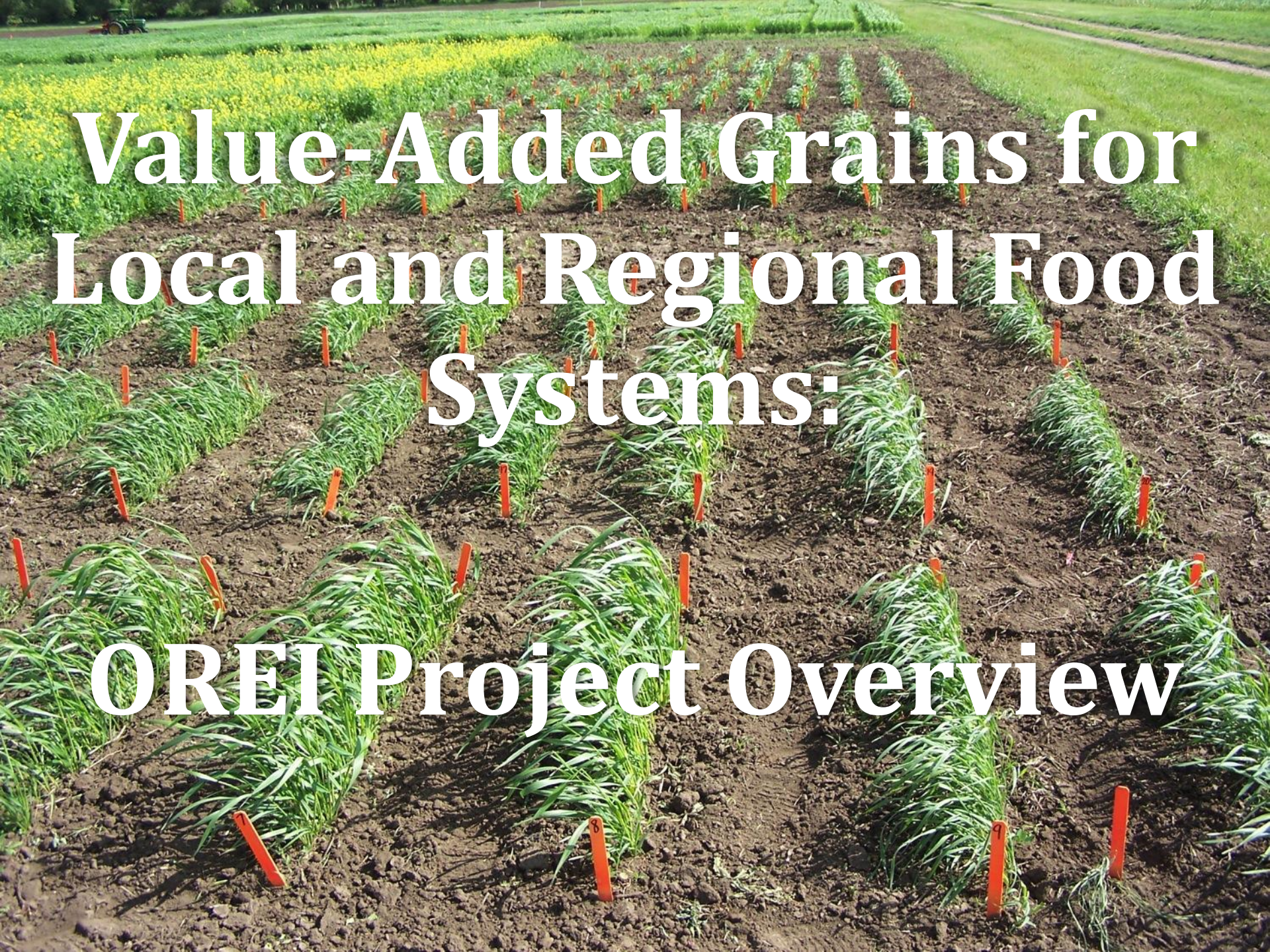
Cowpeas?

Peanuts?

We love Mat Kolding!

Mat gave FBC a wheat line for evaluation (FBC-Dylan) and also a large number of cool tolerant sorghum lines to be evaluated.

White grained sorghum is of great interest right now for the “gluten free” foods trade.



Value-Added Grains for Local and Regional Food Systems:

OREI Project Overview

Project Partners

- Cornell University
- Organic Growers Research Information-Sharing Network
- North Dakota State University
- Northern Plains Sustainable Agriculture Society
- Northeast Organic Farming Association - NY
- Pennsylvania Association for Sustainable Agriculture
- Pennsylvania State University
- Greenmarket/Grow NYC
- Oregon State University

It is all about good food and added value…

Genealogy of cultivated wheat species

Diploids | Tetraploids | Hexaploids

T. boeoticum **AA**
close to *T. urartu*
wild einkorn

T. monococcum
A^mA^m *domesticated*
einkorn

T. urartu
AA

T. dicoccoides
AABB
wild emmer
about 17 000 yrs ago

Aegilops ssp **BB**
close to *A. speltoides,*
species possibly extinct

T. turgidum ssp.
diccocon **AABB**
domesticated emmer
about 10 000 yrs ago

T. aestivum ssp spelta
AABBDD
spelt

T. turgidum ssp durum
AABB
durum, rivet, etc.
about 7 000 yrs ago

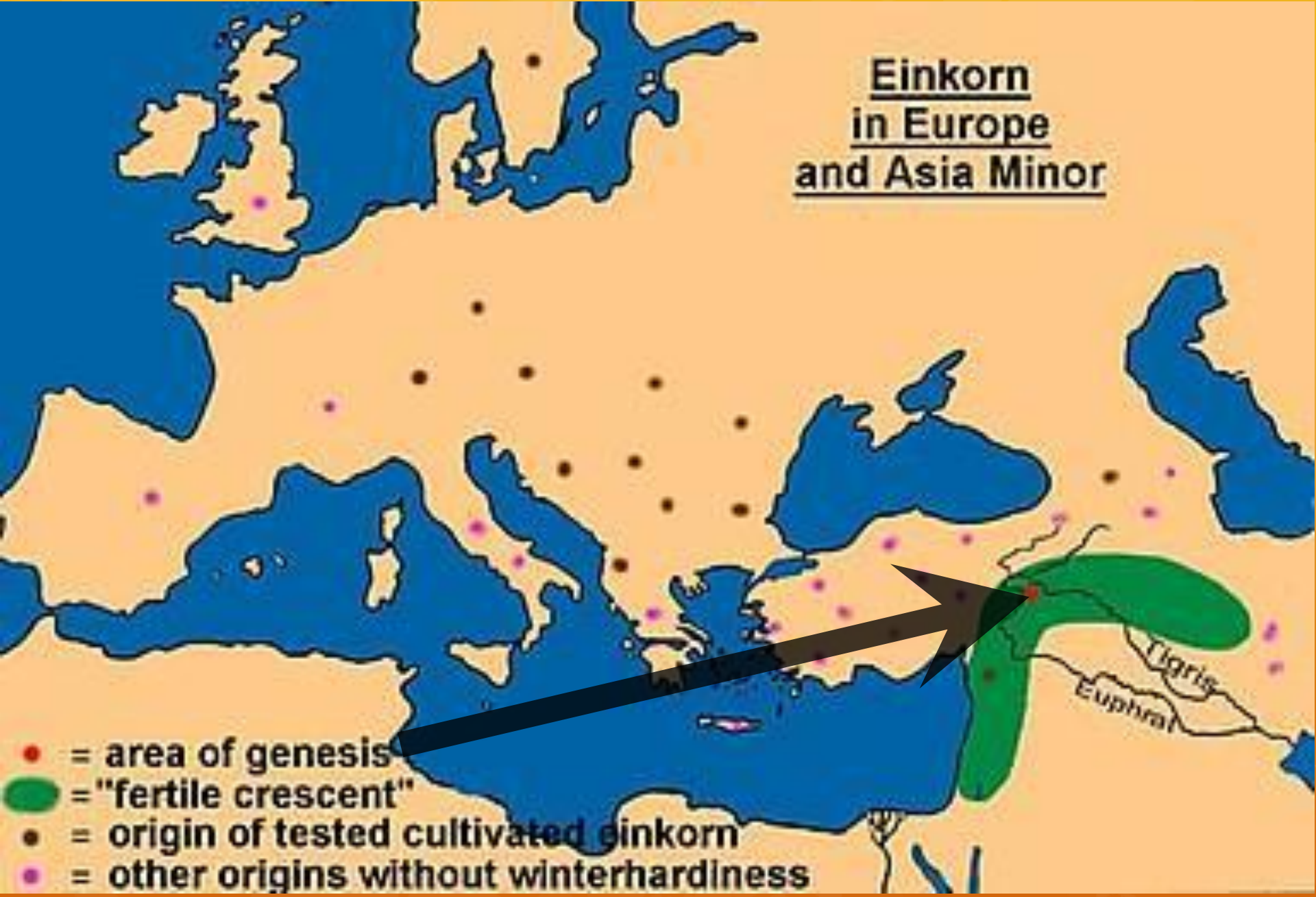
Aegilops
squarosa
DD

T. aestivum ssp
aestivum
AABBDD
bread wheat

Cultivated species in the wheat genus

Diploid:

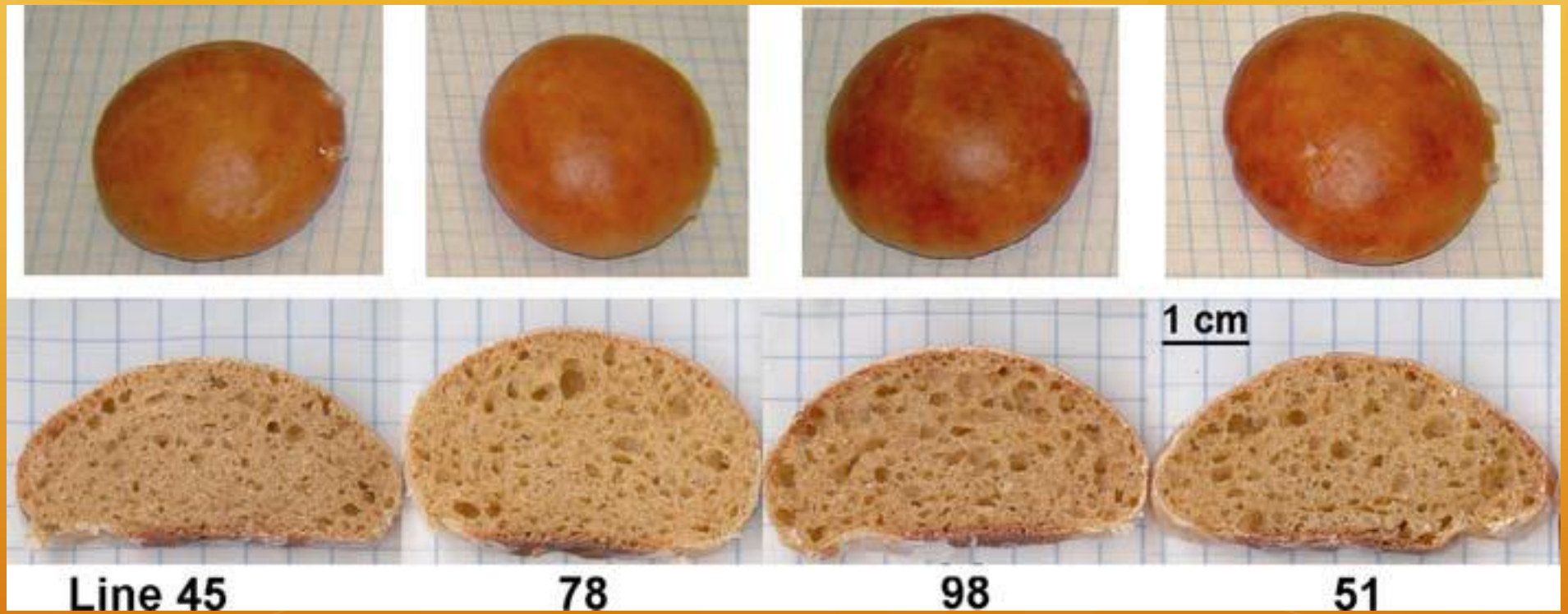
Einkorn: usually hulled, some free threshing
(*T. monococcum ssp. monococcum*)



http://www.darzau.de/index.php?id=88

Einkorn

- Favored for adding excellent flavor to foods.
- Suitable for baked products, some good for bread.
- Higher lipid content than bread wheat (4.2 vs. 2.8 g/100g.
- Usually high in minerals although low in Cadmium.
- Usually higher in protein, lutein, and Vitamin E; Lower in total phenols.
- Has same allergenic proteins as other wheats and sometimes higher gluten content.
- May be lower in some of the gliadins that promote wheat allergies: more research is needed!



From Wieser, H. et al. 2009. Studies on the protein composition and baking quality of einkorn lines. European Food Research and Technology. 229:523-532.

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Slow Food Presidia

- International Presidia
- History
- Objectives
- Action
- Results
- Presidium Vademecum
- Guide Lines
- Propose a Presidium

Slow Food Presidia

« Back to the Map

Haute-Provence Einkorn

Presidium | Producers | Info & contacts

France

For thousands of years, the history of einkorn (Triticum monococcum) has been closely linked to that of the Mediterranean. Until Roman times, this cereal was widely eaten, but later it was almost totally replaced by wheat, tender and durum, which ousted the various minor cereals, due to its higher yield and the fact it needed no processing. As einkorn has a hull, it must always be decorticated (with a similar technique to that used for rice). For a dozen or so years now, einkorn has enjoyed renewed interest, thanks to its rustic sturdy plant that adapts to rather dry climates and poor soil, to its nutritional and organoleptic qualities (it is rich in protein and magnesium). Haute Provence Einkorn (in French petit épeautre) from is a local plant, which can be traced back to

Consumed as a grain or used to make flour, pasta and even beer, the presidium will seek to create appreciation for this eclectic cereal outside of France. The taste qualities and sensorial features that make einkorn so highly prized and distinctive will also be defined in order to allow producers to compare and exchange with other small-scale minor cereal productions throughout the world. Unrivaled by recent industrial varieties, the presidium will work to rediscover and reintroduce the Haute Provence Einkorn's history and quality to the consumer.

Slow Food Presidia for Einkorn in Provence, France

кутя

http://freshsheetnutrition.com/2011/12/19/holiday-traditions-kutya/

Table 2. Performance of einkorn cultivars and landraces†

Variety	2012	2013	Mean	Rank	Test Wt 2013	Rank	Ht cm	Lodging (1-9)	Head dt
TM23	2669	1850	2259	1	38.0	1	101	2	56
WB Alpine‡	NA	1563	MD		33.0	3	106	4	68
PI538722	NA	1497	MD		37.1	2	105	4	61

Variety	Vigor	Days to heading	Plant lodge	Plant height	1000 KWT	Test weight	Seed yield
	1-5		0-9	inch	gms	lbs/bu	lbs/ac
AG1	2.0	62.5	1.0	43.6	30.8	32.0	2678.0
AG2	1.0	.	.	.	.	.	.
WB Alpine	3.5	64.0	3.0	43.0	40.3	32.1	3676.1
PI538722	2.5	58.5	3.0	38.3	40.9	35.4	3037.5
TM23	3.5	55.0	3.8	35.2	44.0	34.6	3857.5
Mean	2.5	60.0	2.7	40.0	39.6	33.7	3363.0
C.V.%	25.3	1.2	26.5	4.4	2.8	2.1	6.0
LSD.10	0.8	1.0	1.0	2.3	1.5	0.9	264.2


Organic Einkorn
Seeding Rate
90 lbs/Ac

Seeding rate	Plant lodge	Plant height	1000 KWT	Test weight	Seed yield
PLS/ac	0-9	inches	gms	lbs/bu	lbs/ac
50 lbs.	0.5	31.6	32.8	34.8	2163.0
75 lbs.	2.3	30.0	32.0	34.2	2612.1
100 lbs.	2.3	31.9	32.0	34.0	2440.8
125 lbs.	3.5	30.8	32.2	34.0	2516.9
150 lbs.	4.5	30.9	31.6	33.6	2562.9
Mean	2.6	31.0	32.1	34.1	2459.1
LSD .05	2.9	NS	NS	0.9	324.3

Seeding rate	Plant stand	Spike count	Days to heading	Plant lodge	Plant height	1000 KWT	Test weight	Seed yield
PLS/ac	sq ft	sq ft		0-9	inches	gms	lbs/bu	lbs/ac
50 lbs.	13.4	52.5	57.3	1.8	35.2	43.6	33.2	3117.3
75 lbs.	23.9	56.6	56.3	2.3	35.5	42.1	33.7	3555.3
100 lbs.	25.9	64.8	55.8	4.8	34.6	42.3	33.6	3621.0
125 lbs.	40.4	63.4	55.8	4.8	34.0	41.3	33.6	3571.2
150 lbs.	44.7	70.3	55.3	7.8	33.1	42.0	32.3	3640.5
Mean	29.7	61.5	56.1	4.3	34.5	42.2	33.3	3501.1
LSD .05	7.1	12.8	1.1	1.7	1.3	NS	NS	432.0

Cultivated species in the wheat genus

Tetraploid:

Rivet: free threshing (*T. turgidum* ssp. *turgidum*)

Durum: free threshing (T. turgidum ssp. durum)

Emmer: hulled (*T. turgidum* ssp. *dicoccon*)

Khorosan: free threshing (*T. turgidum* ssp. *turanicum*)

Polish: free threshing (T. turgidum ssp. polonicum)





Spread of Emmer

(adapted from Zaharieva et al. 2010. Genetic Resources and Crop Evolution)

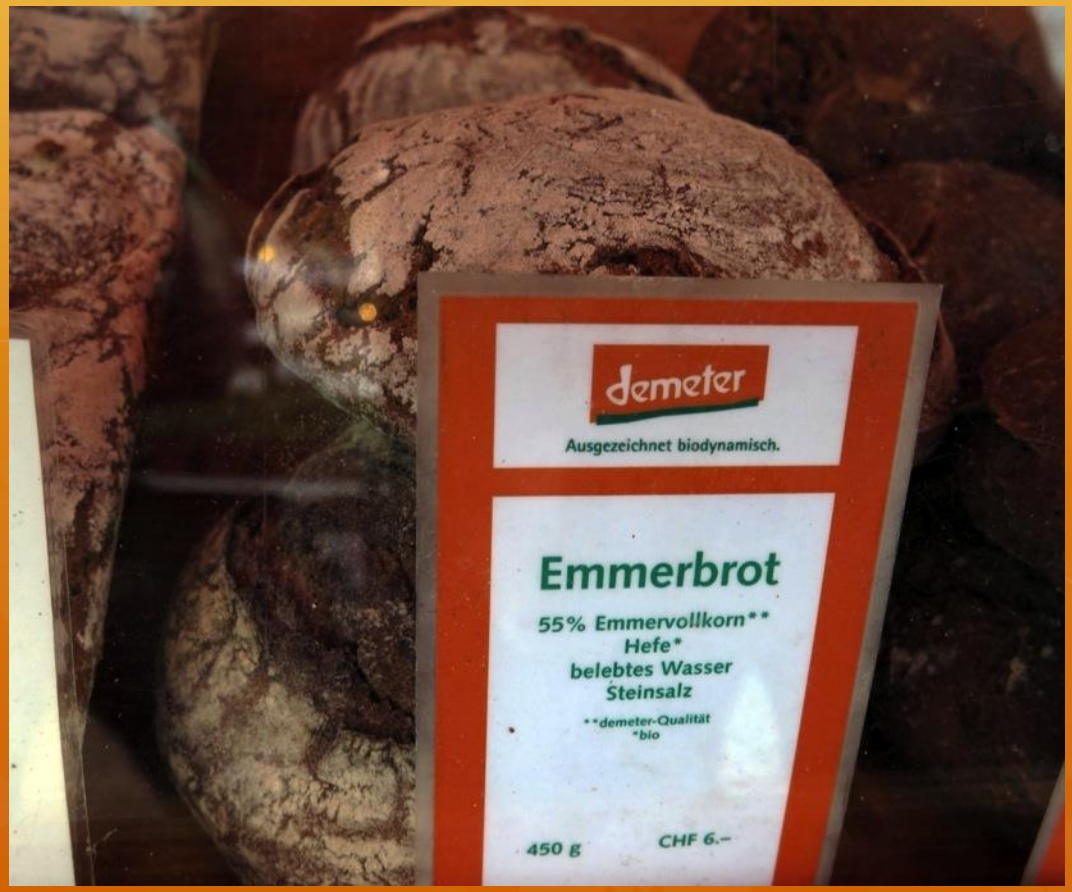
"Emmer"

- Favored for adding excellent flavor to foods.
- Recommended for children and new mothers in Ethiopia (high protein) and for diabetics in India (low glycemic index).
- Gluten varies from very low to higher than bread wheat: bread making properties vary but are usually lower than bread wheat. Missing some gliadin proteins.
- Usually has higher minerals and higher fiber.
- Often has higher antioxidants (total phenolics and flavonoids). Not high in carotenoids.

http://blog.khymos.org/2010/12/22/no-knead-bread/

Sprouted Emmer

Emmer bread is delicious, it tends to be more dense, as it has a lower "gluten" content than bread wheat.



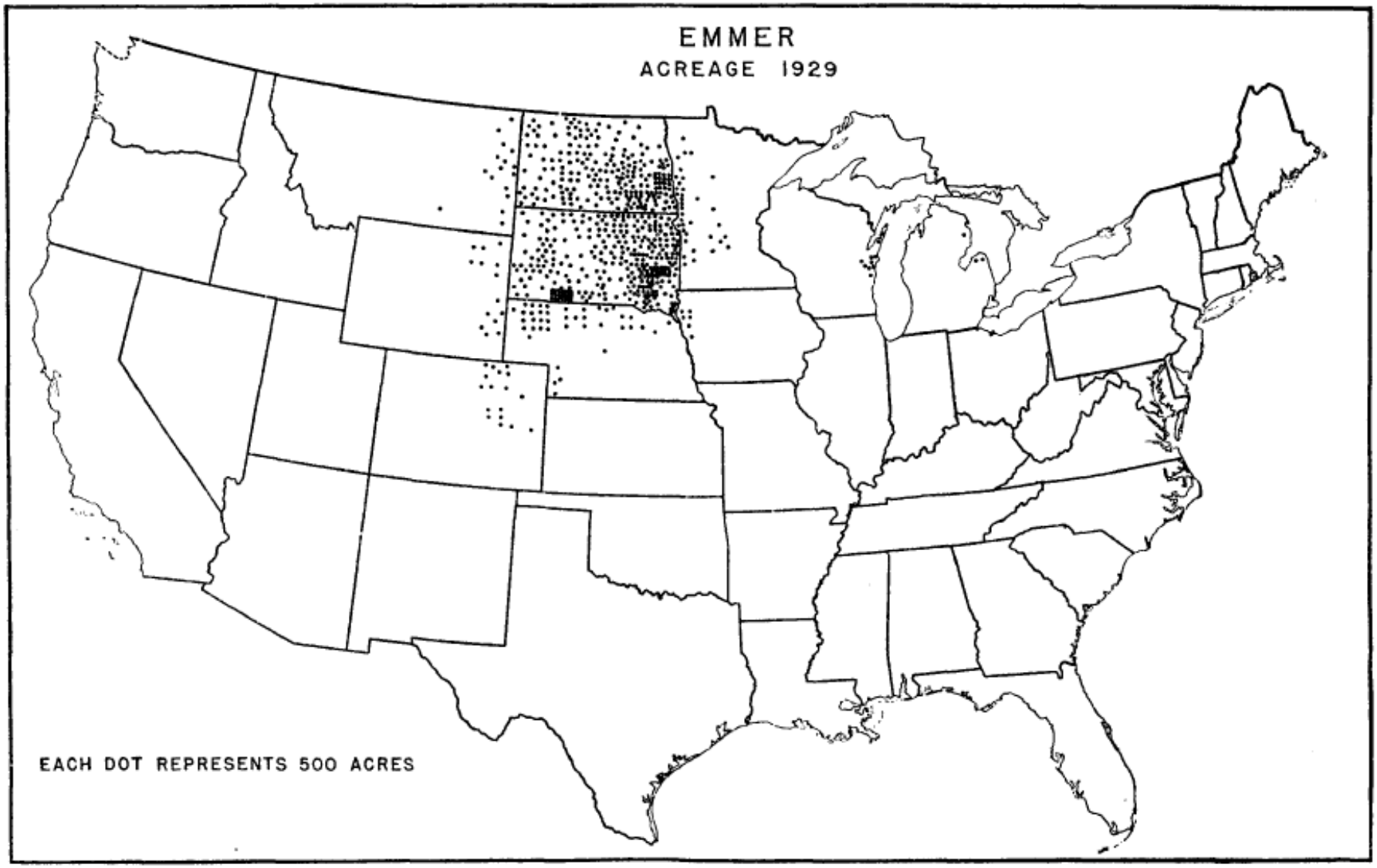


FIGURE 5.—Outline map of the United States, showing the distribution of emmer in 1929, according to the United States census. Estimated area, 344,000 acres. Each dot represents 500 acres.

Table 1. Performance of top ten emmer cultivars†

Name Variety	Yield (kg/ha) FV	PA	WB	ND	Mean	Test Weight (kg/hl) 2013	Rank	Ht-cm	Lodging (1-9)	Heading
Lucille	2820	802	3216	4220	2765	44.0	6	109	3	56
Red Vernal	2550	839	3206	3885	2620	44.5	4	109	3	57
ND Comm.	2658	891	2984	3860	2598	44.7	3	107	4	57
Vernal	2699	917	3050	3555	2555	45.2	2	106	2	56
MC Comm.	2393	687	2193	3170	2111	44.1	5	105	3	57
PI254148	1693	669	3217	2595	2043	36.2	13	74	3	49
Common-M	2293	601	2263	3014	2043	43.2	7	106	3	57
Common-R	2222	508	2133	2959	1955	41.7	9	102	3	58
Common-H	2019	598	2058	3130	1951	42.3	8	101	4	57
Bowman	2022	578	1907	3201	1927	41.2	10	102	4	57

Variety	Vigor 1-5	Days to heading	Plant Lodge 0-9	Plant Height Inches	1000 KWT gms	Test Weight lbs/bu	Seed Yield lbs/A
Bowman	3.8	59.5	2.0	33.5	58.3	38.4	3305.8
Bread 4	3.5	54.0	4.0	23.2	66.9	34.6	2331.9
Common-H	3.5	60.5	3.5	33.5	55.4	38.7	3405.7
Common-M	3.0	59.5	0.3	32.9	62.8	38.9	2798.1
Common-MC	3.3	59.5	1.0	34.2	60.3	38.0	3012.2
Common-R	3.0	60.3	1.5	31.2	65.1	38.8	2989.7
Debra	1.3	52.3	0.0	22.7	39.1	58.1	1943.4
Kamut	4.8	55.3	3.8	31.9	62.0	61.0	2681.4
Lucille	4.8	58.3	3.3	33.0	71.6	37.2	4406.9
ND Common	4.0	59.5	3.3	35.7	65.8	39.0	3934.8
PI254148	3.3	50.3	4.0	19.3	68.4	33.4	2310.0
PI254162	2.0	54.3	5.8	24.0	62.8	35.1	2482.6
Red Vernal	4.5	59.8	1.8	36.6	69.9	37.7	3791.0
Vernal	3.8	58.3	0.5	33.9	72.1	39.1	3273.5
Yaroslav	4.3	58.8	3.3	32.2	65.8	39.1	3604.9
Mean	3.5	57.3	2.5	30.5	63	40.5	3084.8
C.V.%	24.9	0.9	52.2	7.8	7.4	2.8	16.9
LSD.10	1	0.6	1.6	2.9	5.6	1.3	619

2013 emmer variety trials
% dehulled by location

Variety	Carr	Rob	Cat	Avg
	%	%	%	%
Bowman	60.5	61.0	52.8	58.1
Bread 4	44.4	41.3	43.5	43.1
Common-H	59.8	61.0	53.2	58.0
Common-M	60.5	61.0	51.3	57.6
Common-MC	59.3	61.0	51.3	57.2
Common-R	58.8	61.4	53.6	57.9
Debra	96.4	97.8	93.9	96.0
Kamut	98.2	98.9	92.6	96.6
Lucille	61.0	62.4	53.6	59.0
ND Common	57.6	59.3	54.1	57.0
PI254148	28.7	24.8	28.4	27.3
PI254162	50.8	45.8	48.6	48.4
Red Vernal	61.5	61.7	58.1	60.4
Vernal	60.8	57.0	57.5	58.4
Yaroslav	57.6	57.5	52.4	55.8
Mean	61.1	60.5	55.0	
C.V.%	2.7	6.5	8.2	
LSD.10	2	4.7	5.4	


ORGANIC
EMMER
SEEDING
RATE

Seeding rate	Plant lodge	Plant height	1000 KWT	Test weight	Seed yield
PLS/ac	0-9	inches	gms	lbs/bu	lbs/ac
50	2.0	36.5	69.1	35.8	2556.2
75	2.8	35.9	68.3	35.5	2991.7
100	5.3	34.8	64.7	35.6	3206.5
125	4.5	34.7	63.9	35.9	3043.0
150	5.0	36.2	65.5	35.8	3319.3
Mean	3.9	35.6	66.3	35.7	3023.3
LSD .05	2.3	NS	NS	NS	295.5

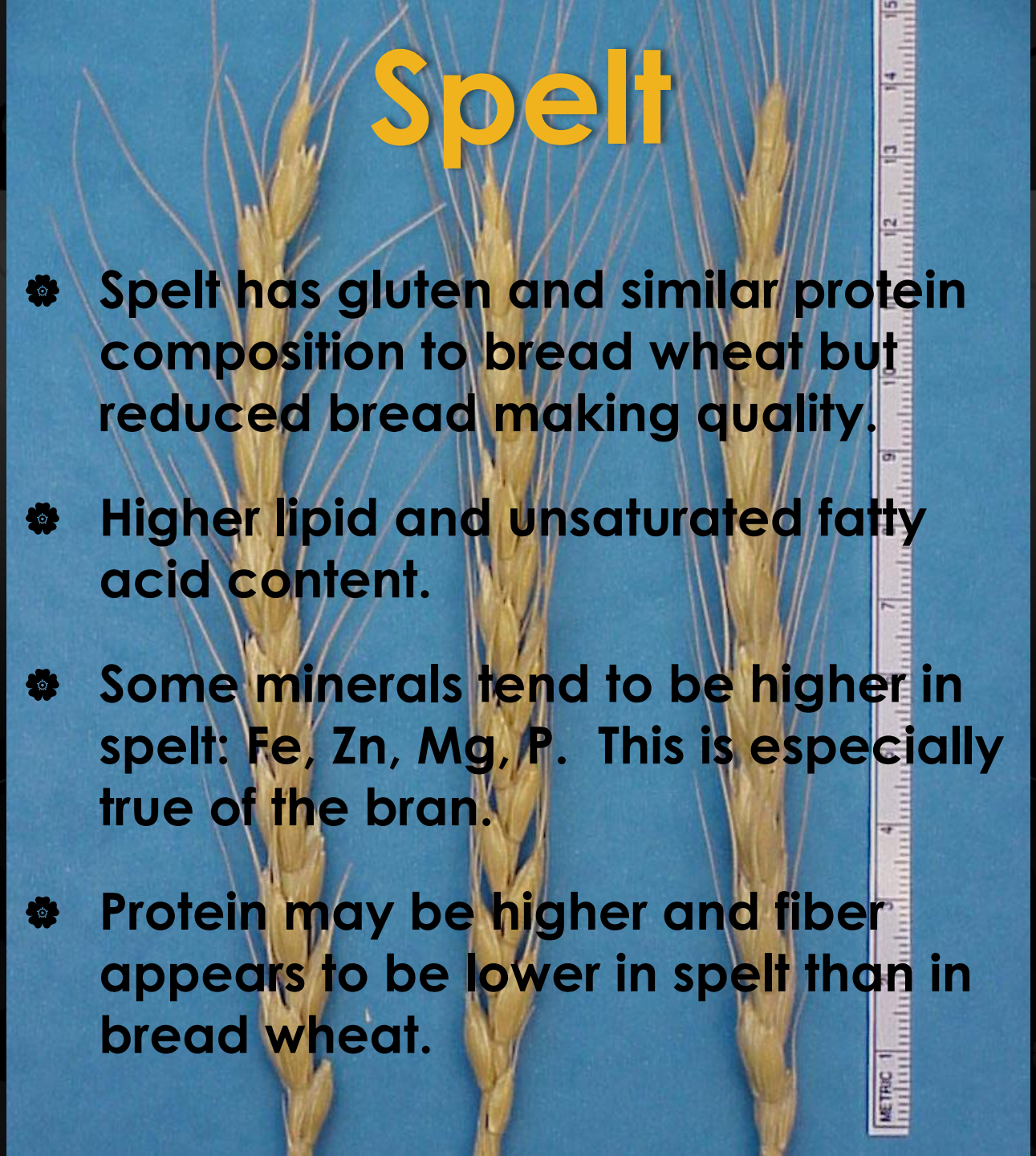
Seeding rate	Plant stand	Days to heading	Plant lodge	Plant height	1000 KWT	Test weight	Seed yield
PLS/ac	sq ft		0-9	inches	gms	lbs/bu	lbs/ac
50 lbs.	16.0	58.5	2.5	35.0	84.0	35.5	3138.4
75 lbs.	25.4	58.5	5.8	33.5	73.7	34.1	3429.6
100 lbs.	35.1	58.3	5.0	33.0	72.0	33.9	3346.8
125 lbs.	42.2	59.0	5.3	32.8	65.5	34.1	3414.5
150 lbs.	53.5	58.3	5.8	33.8	68.2	34.3	3409.8
Mean	34.4	58.5	4.9	33.6	72.7	34.4	3347.8
LSD .05	5	NS	1.7	2	5.7	1.6	NS

Cultivated species in the wheat genus

Hexaploid:
Bread wheat: free threshing (*T. aestivum* ssp. *aestivum*)
Club wheat: free threshing
(*T. aestivum* ssp. *compactum*)
Spelt: hulled (*T. aestivum* ssp. *spelta*)
Indian wheat: free threshing
(*T. aestivum ssp. sphaerococcum*)




Spelt



- Spelt has gluten and similar protein composition to bread wheat but reduced bread making quality.
- Higher lipid and unsaturated fatty acid content.
- Some minerals tend to be higher in spelt: Fe, Zn, Mg, P. This is especially true of the bran.
- Protein may be higher and fiber appears to be lower in spelt than in bread wheat.

Romans, Brooklyn, NY

Bread Alone Bakery, Boiceville, NY

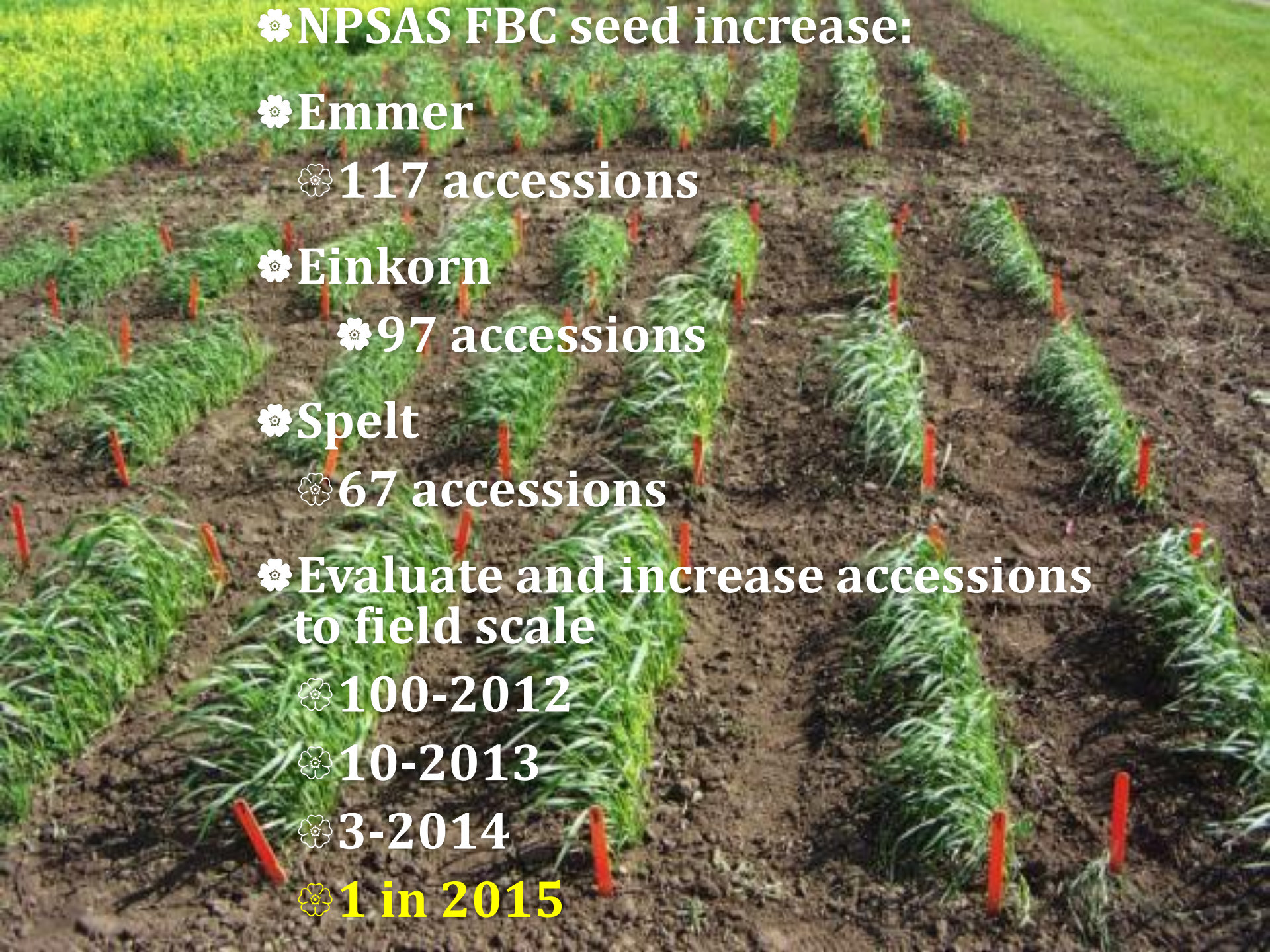
We ❤ spelt breads!

Wide Awake Bakery, Trumansburg, NY

Table 2. Performance of spelt cultivars and landraces†

Variety	2012	2013	Mean	Rank	Test Wt 2013	Test Wt Rank	Ht cm	Lodging (1-9)	Heading
Maverick	3187	4355	3771	1	35.0	3	103	0.9	30
Sungold	NA	3761	MD		34.0	5	104	0.0	41
Comet	NA	3358	MD		33.0	6	75	0.2	33
Oberkulmer	2752	3343	3048	2	35.0	4	119	0.0	38
Frank	2520	3262	2891	4	38.0	1	110	0.5	42
PI348159	2644	3178	2911	3	37.0	2	110	0.5	43
94-288	NA	2167	MD		40.0	4	90	3	51
AC Boveria	1941	2044	2298	2	41.3	3	120	3	61
CDC Zorba	2489	2817	2453	1	38.1	5	118	1	59
Forage Spelt	NA	2343	MD		45.0	2	121	3	56
SK3P	NA	2367	MD		46.0	1	120	2	57

Variety	Vigor	Days to heading	Plant lodge	Plant height	1000 KWT	Test weight	Seed yield
	1-5		0-9	inch	gms	lbs/bu	lbs/ac
94-288	3.3	54.5	4.0	35.0	101.9	31.5	2877.6
AC-Boveria	3.3	65.5	4.3	42.6	103.4	31.4	2712.2
CDC Zorba	1.3	62.0	0.5	44.7	101.2	28.6	3804.2
Forage Spelt	4.5	56.0	3.5	42.6	121.2	33.7	3290.0
Red Chaff	5.0	48.0	1.0	30.3	110.9	32.0	2441.8
SK3P	4.0	57.0	2.0	44.3	125.2	35.6	3379.5



- NPSAS FBC seed increase:
- Emmer
  - 117 accessions
- Einkorn
  - 97 accessions
- Spelt
  - 67 accessions
- Evaluate and increase accessions to field scale
  - 100-2012
  - 10-2013
  - 3-2014
  - 1 in 2015

FBC GRIN Seed Increase

Larger plot in 2013

FBC GRIN Seed Increase: 2014 and beyond!

seed increase scenario

year	plant	harvest
2012	1 gm 4 ft row	100 gms
2013	100 gms .003 ac	2500 gms
2014	5.5 lbs (2500 gms) .05 ac	100 lbs
2015	100 lbs 1 ac	2000 lbs
2016	Possible to plant 10-20 ac or more	40,000 lbs?????

ND Common emmer field

Lewis Seibold, Cathay, ND 2008

FBC GRIN evaluations einkorn-2013

ACP	ACNO	PLANTID	COUNTRY	STATE	Early vigor	Head date	Plant height	Plant lodge	Seed yield
					1-5		cms	0-9	gms
PI	428151	G863	Italy	Latium	3	187	88	2	3720
PI	170196	2497	Turkey	Kirklareli	4	186	91	0	3289
PI	428171	G2920	Turkey	Edirne	5	187	95	1	4150
PI	349049	WIR 23650	Armenia		5	187	85	3	2761
PI	428150	G806	Romania		1	192	89	0	2670
PI	428159	G1483	United Kingdom	England	2	190	84	0	2997
PI	428156	G1471	United Kingdom	England	2	187	98	0	3673
PI	428173	G2924	Turkey	Tekirdag	3	187	83	2	3679
PI	167526	2485	Turkey	Kirklareli	4	187	93	4	3780
PI	191383	Laetissimum	Ethiopia		1	188	73	1	3485

FBC GRIN evaluations

emmer-2013

ACP	ACNO	PLANTID	COUNTRY	STATE	Early vigor	Head date	Plant height	Plant lodge	Seed yield
					1-5		cms	0-9	gms
PI	164578	9000	India	Tamil Nadu	5	183	63	1	1804
PI	322232	NP 201	India	Delhi	4	179	48	0	1097
PI	94681	373	Germany		5	187	73	4	950
PI	234868	Debra Markos	Ethiopia	Gojam	5	181	62	3	1224
PI	361833	Adjaz	Denmark		1	182	50	2	819
PI	164582	Godumai	India	Tamil Nadu	3	183	56	1	1040
PI	217639	13879	India	Tamil Nadu	4	183	58	1	1648
PI	2789	Yaroslav Spring	Russian Federatio	Yaroslavl	4	189	70	1	1979
PI	276021	129	Spain	Oviedo	3	205	108	1	2110
PI	94741	288	Ukraine	Kharkiv	5	188	86	0	1501

FBC GRIN evaluations
spelt-2013

ACP	ACNO	PLANTID	COUNTRY	STATE	Early vigor 1-5	Head date	Plant height cms	Plant lodge 0-9	Seed yield gms
PI	348706	69Z6.890	Spain	Oviedo	4	195	98	1	1828
PI	469024	MG 27181	Spain		5	194	100	2	1883
PI	469056	MG 27220	Spain		4	198	101	0	2001
PI	469025	MG 27182	Spain		3	196	102	3	2047
PI	469045	MG 27207	Spain		1	196	92	3	1234
PI	469057	MG 27221	Spain		4	196	100	0	2643
PI	348761	69Z6.947	Spain	Oviedo	5	193	93	4	2482
PI	348745	69Z6.931	Spain	Oviedo	4	198	107	1	2017
PI	348711	69Z6.895	Spain	Oviedo	3	195	106	3	2096
PI	355580	SK 3P	Switzerland		4	195	98	1	2545

Thanks! You are invited to NPSAS summer field days in the Dakotas and our Winter Conference in Aberdeen, SD next January. For more info please visit http://npsas.org/.