

Seed Size and Fertility Relationships of WI 643 Alfalfa Grown at Lodi, Italy

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This study evaluated the seed size and some other fertility relationships of WI 643 that was developed at Madison, Wisconsin, USA. The goal was to study WI 643 in a different region and compare it with different materials. The pedigree of WI 643 was reported by Haas and Edwards in Volume 4 of this website. They also report seed size relationships in comparison with other materials grown at Ithaca, New York, USA.

WI 643 (120 plants) was transplanted at the end of September 2003 in tube-plots 80x5 cm at I.S.C.F., Lodi, Lombardy, Italy; in summer 2004, selfing and polycross were performed by hand in a pollination cage. As for selfing, 200 flowers/plant were tripped; the polycross, in subgroups of 18 plants, was made on two inflorescences/plant (5 flowers/inflorescence). The amount of pollen (on 20 flowers/plant) was visually estimated with a scale 1-5.

Plant ID no.	Self			Pollen scale 1-5	Polycross			Notes
	Pod no.	Seed no.	Seed weight		Pod no.	Seed no.	Seed weight	
1	50	109	0.395	3	9	48	0.1751	
2	40	79	0.2386	3	6	20	0.0597	
3	142	573	1.8497	3	9	58	0.1813	
4	102	225	0.8164	5	9	47	0.1582	
5	78	236	0.8278	5	10	37	0.125	
6	61	90	0.2661	4	9	40	0.109	
7	50	86	0.3174	3.5	10	56	0.1965	
8	71	140	0.4627	5	8	31	0.0939	
9	132	309	1.0802	4	4	26	0.0826	
10	8	10	0.0327	2.5	10	64	0.2107	LMS
11	37	53	0.1893	5	8	44	0.155	
12	71	133	0.5111	4.5	10	60	0.1971	
13	94	172	0.6367	nd	10	62	0.217	
14	0	0	0	3	5	14	0.0385	Selfsterile
15	152	430	1.4785	3.5	9	46	0.1519	
16	0	0	0	2	8	34	0.099	LMS
17	85	183	0.5719	3.5	8	53	0.1577	
18	63	133	0.435	4.5	10	47	0.1455	
19	112	407	1.4014	nd	0	0	0	Autogamous
20	115	300	0.999	5	9	35	0.1155	
21	95	252	0.842	5	10	63	0.195	
22	20	26	0.1036	3.5	10	60	0.2209	
23	100	260	0.8341	5	4	31	0.1055	
24	96	201	0.6885	3.5	10	52	0.163	
25	70	270	0.8171	4	10	38	0.1081	
26	27	59	0.2017	3.5	10	53	0.1618	
27	70	139	0.4413	3	7	35	0.1055	
28	97	290	1.0024	5	8	25	0.0831	Autogamous
29	2	3	0.0088	2.5	7	30	0.0889	LMS
30	0	0	0	2.5	10	54	0.1676	LMS
31	131	226	0.8338	nd	9	54	0.1724	Autogamous

32	0	0	0	3	6	29	0.0848	Selfsterile
33	60	125	0.4467	5	10	49	0.1633	
34	26	26	0.1026	4	8	49	0.1796	
35	1	2	0.0072	4	7	22	0.0722	
36	0	0	0	3	10	46	0.1647	
37	3	4	0.0146	nd	9	45	0.134	
38	143	465	1.6254	5	9	54	0.1786	
39	18	32	0.1266	5	10	50	0.1803	
40	62	209	0.6363	4	8	45	0.1326	
41	28	54	0.1796	4	8	27	0.0863	
42	28	57	0.1979	3	10	62	0.1981	
43	5	9	0.0336	3	5	14	0.0485	
44	5	5	0.0169	1.5	5	21	0.0668	LMS
45	44	82	0.2647	4	10	50	0.157	
46	18	21	0.0816	5	9	31	0.1127	
47	10	16	0.0602	5	7	25	0.0821	
48	98	260	0.8512	5	5	21	0.0656	
49	55	138	0.4504	4	6	25	0.0793	
50	146	321	0.9336	nd	0	0	0	Autogamous
51	23	45	0.1733	5	7	34	0.1141	
52	22	48	0.1676	5	6	27	0.0835	
53	24	44	0.1692	5	10	45	0.1609	
54	66	142	0.4799	4.5	8	60	0.1933	
55	59	105	0.3677	4	6	28	0.0911	
56	30	65	0.2399	3.5	3	15	0.0575	
57	55	150	0.5695	5	8	41	0.157	
58	0	0	0	1.5	9	34	0.1024	LMS
59	33	76	0.2694	4	7	23	0.078	
60	32	84	0.301	3.5	7	29	0.0897	
61	19	52	0.0195	3	3	10	0.0267	
62	28	76	0.2468	3	7	33	0.1067	
63	19	47	0.1746	5	8	40	0.1314	
64	5	3	0.0085	2	2	2	0.0058	LMS
65	18	35	0.1379	4	7	42	0.1509	
66	2	4	0.0133	3.5	7	39	0.1213	
67	93	223	0.7418	5	9	41	0.1289	
68	30	54	0.1722	4	7	33	0.1011	
69	3	4	0.0138	4	8	31	0.1033	
70	0	0	0	1	5	29	0.0777	MS
71	0	0	0	1.5	3	7	0.0191	LMS
72	74	167	0.6329	3.5	10	67	0.2292	
73	43	63	0.2277	4	8	40	0.1353	
74	188	369	1.3823	5	10	67	0.2376	
75	18	42	0.1395	3.5	8	35	0.1196	
76	23	37	0.1349	2.5	10	49	0.1594	LMS
77	0	0	0	2.5	8	41	0.1139	LMS
78	2	3	0.0108	4	1	2	0.0065	
79	122	356	1.0814	3.5	9	57	0.1566	
80	134	340	1.1726	4	7	37	0.1336	
81	15	31	0.0936	3.5	7	42	0.1202	
82	37	59	0.1853	3.5	9	26	0.0704	
83	19	30	0.1091	5	6	35	0.1143	
84	1	1	0.0033	5	0	0	0	Selfsterile

85	4	7	0.0233	5	5	17	0.0541	
86	16	38	0.1325	5	10	46	0.1494	
87	0	0	0	1	3	9	0.0245	MS
88	37	64	0.2167	4	9	42	0.1312	
89	46	126	0.3622	5	10	33	0.0907	Autogamous
90	113	270	0.8717	5	8	42	0.1318	Autogamous
91	0	0	0	2	8	25	0.0767	LMS
92	149	412	1.3688	3	9	33	0.0988	
93	99	250	0.751	3.5	10	44	0.1284	
94	0	0	0	3	6	18	0.052	Selfsterile
95	0	0	0	2.5	9	33	0.106	LMS
96	0	0	0	2	8	37	0.1185	LMS
97	12	32	0.1153	3.5	6	32	0.1126	
98	61	139	0.4073	3.5	8	49	0.1377	
99	92	206	0.7412	3	9	47	0.143	
100	232	505	1.5304	nd	9	56	0.1506	Autogamous
101	0	0	0	1	4	9	0.0283	MS
102	92	179	0.5204	4	9	32	0.0947	
103	43	99	0.3515	4	9	47	0.1636	
104	5	4	0.0135	3	5	15	0.0522	Selfsterile
105	9	16	0.0609	3.5	9	42	0.1529	
106	74	183	0.6157	3	7	26	0.0783	
107	0	0	0	nd	0	0	0	
108	20	39	0.1303	4	4	16	0.0389	
109	0	0	0	1	9	28	0.0731	MS
110	11	17	0.0598	4	8	38	0.1301	
111	12	24	0.0848	5	10	47	0.1502	
112	21	50	0.1548	4	9	38	0.1194	
113	67	161	0.5697	4	9	49	0.1562	
114	128	273	0.8714	nd	7	39	0.1253	
115	24	57	0.217	3	6	31	0.1103	
116	2	3	0.0108	4	6	29	0.0979	
117	3	4	0.0134	5	5	22	0.0645	
118	101	194	0.5981	5	11	44	0.1391	
119	28	40	0.1116	4	6	30	0.0844	
120	0	0	0	1	9	45	0.137	MS

There were five male sterile (MS) plants, 13 leaky male sterile (LMS), and five self sterile plants. In addition, 12 other plants produced fewer than ten self seeds, for a total of 35 out of 120 plants that functioned mainly as seed parents. On the other hand, there were seven plants that produced seed autogamously.

On average, WI 643 showed a 1000 seed weight of 3.39 g in self and 3.18 in polycross significantly higher than the average value of 2.54 found for alfalfa material from many different origins grown and polycrossed in the same year and conditions at Lodi. In addition, 1000 seed weight of WI 643 was higher than the average value of 2.19 g found for a set of 14 Italian and European varieties (commercial seed). It could be interesting to note that an average value of 3.38 g, not significantly different from that of WI 643, was found for Egyptian material collected in Siwa Oasis and selfed at Lodi in 2004.

It would be interesting to use WI 643 in a mixed planting with a line of normal seed size and some type of marker. The larger seeds could be recovered by grading and the hybrid frequency could be determined.