

1 **DRAFT MARCH 30, 2003**

2 IDAHO AGRICULTURAL EXPERIMENT STATION
3 Moscow, Idaho

4 OREGON AGRICULTURAL EXPERIMENT STATION
5 Corvallis, Idaho

6 Announce the release of
7 IDAHO 587
8 SOFT WHITE WINTER WHEAT

9 Idaho 587, soft white winter wheat (*Triticum aestivum*, L.), was developed
10 by the Idaho Agricultural Experiment Station in cooperation with the Oregon
11 Agricultural Experiment Station for use by grain producers in the Pacific
12 Northwest. Idaho 587 is a backcross derivative of the soft white winter wheat
13 cultivar 'Stephens' that carries the *A/s1* gene for tolerance to the imidazolinone
14 class of herbicides developed by the BASF Corporation for use in controlling
15 pernicious weeds of winter wheat and generically given the name 'Clearfield'.

16 Idaho 587 was derived from the third backcross of Stephens to the
17 imidazolinone-resistant line 'Fidel-FS4', with the backcross having the pedigree
18 Stephens*4/Fidel-FS4. The imidazolinone resistance in Fidel-FS4 was derived
19 through mutagenesis of the imidazolinone-susceptible cultivar 'Fidel', followed by
20 selection of the mutagenized population with imidazolinone herbicides. The
21 herbicide tolerance carried in 'Fidel-FS4' is conditioned by a mutant allele of the
22 acetolactate synthase enzyme with the allele designation *A/s1*. The BC₃F₂ seed
23 of the cross Stephens*4/Fidel-FS4 was developed under contract by the
24 American Cyanamid Corporation (subsequently acquired by BASF) and
25 transferred to the University of Idaho under a material transfer agreement for
26 utilization in selection and breeding. In 1996, the BC₃F₂ population designated
27 9697WAG460 was planted at Aberdeen, Idaho, and individual plants similar in
28 appearance to Stephens were selected in fall 1997. BC₃F₃ seed of individual
29 plant selections were planted at Aberdeen in fall 1997, with a random selection of
30 heads collected in fall 1998 and planted as headrows at Aberdeen in fall 1998.
31 Twenty BC₃F₃ seed of individual plant selections were planted in the greenhouse
32 in winter 1999 and treated with imazamox (2-[4,5-dihydro-4-methyl-4-(1-
33 methylethyl)-5-oxo-1H-imidazol-2-yl]-5-(methoxymethyl)-3-pyridinecarboxylic

34 acid, BASF Corp) to identify BC₃F₂ families homozygous for *A/s1*. Headrows
35 derived from BC₃F₂ families homozygous for *A/s1* were selected in spring 1999
36 for uniformity and general agronomic appearance. Among these rows, a row
37 designated W99-12-6 was harvested in 1999 and placed into yield testing and
38 herbicide tolerance trials in southern Idaho in fall 1999. W99-12-6 was yield
39 tested Aberdeen in 1999-2000, then placed in multi-location yield trials in 2000-
40 2001. In 2001 and 2002, W99-12-6 was evaluated under the breeding line
41 number IDO587 in cooperative testing with Oregon State University, University of
42 Idaho Extension Testing, and the University of Idaho Weed Science Program. In
43 fall 2000, 400 heads were selected from W99-12-6 and planted in the field at
44 Aberdeen that same year. In spring 2001, the headrows were selected with
45 imazamox herbicide for uniformity of tolerance. Headrows were uniformly
46 tolerant to imazamox. Any headrows not similar in appearance to Stephens were
47 discarded. Remaining BC₃F_{3:6} headrows were harvested and planted at
48 Aberdeen in fall 2001 to form breeder seed of Idaho 587. Idaho 587 has been
49 stable and uniform for herbicide tolerance and appearance for four years.

50 Idaho 587 is most similar to the cultivar Stephens with an unpigmented
51 coleoptile, dark green foliage, and a prostrate to semi-erect fall growth habit.
52 Idaho 587 is a semi-dwarf, winter wheat that is approximately 85 cm tall at
53 maturity, similar to Stephens and Madsen (both 86 cm), but taller than 'Brundage
54 96' (83 cm) and shorter than 'Hubbard' (97 cm). Like Stephens, Idaho 587 is a
55 medium maturity cultivar heading 159 days after January 1st, approximately a day
56 earlier than Stephens and four days earlier than 'Madsen'. Idaho 587 has broad,
57 recurved flag leaves, is awned, with yellow anthers at anthesis and white colored
58 chaff at maturity. Idaho 587 has large, plump, oval, soft white seed with a wide
59 crease, short brush, mid-sized embryo, and an average seed size is 46 mg
60 (compared with 42 mg for Stephens). The seed of Idaho 587 is similar to
61 Stephens for polyphenol oxidase activity. In replicated evaluations in Moscow,
62 Idaho, Lewiston, Idaho, Pullman, Washington, and Mount Vernon, Washington,
63 Idaho 587 had both seedling and adult plant resistance to the dominant races of
64 stripe rust [caused by *Puccinia striiformis* (Westend.), races PST-14, 22, 23, 26,

65 35, 40, 41, 45, 53, 61, 74, 78, 85, 91, 92, 93, 97, 98, 99], without observable
66 necrosis or pustule formation. Idaho 587's stripe rust resistance is similar to
67 Stephens and likely derives from that cultivar. Other disease resistances and
68 susceptibilities for Idaho 587 are expected to be similar to Stephens.

69 The primary difference between Idaho 587 and Stephens is Idaho 587's
70 tolerance to imazamox herbicide. In two years of evaluation at Aberdeen, Idaho
71 and one year of evaluation at Pendleton, Oregon and Moscow, Lewiston, and
72 Nez Perce, Idaho, using one to four times the recommended rates of imazamox
73 herbicide, Idaho 587 a did not have significantly different response to imazamox
74 than Fidel-Fs4, the source of Idaho 587's herbicide tolerance. In two years of
75 trials at Aberdeen, 45 g ai ha⁻¹ imazamox was sufficient to kill 100% of the
76 Stephens check but did not significantly reduce grain yield of Idaho 587. At the
77 same rate of herbicide, in a spring application at 6 site-years across Idaho and
78 Oregon, Idaho 587 had an average grain yield of 6.1 Mg ha⁻¹ compared with 6.3
79 Mg ha⁻¹ for Fidel-Fs4 (not significantly different).

80 In yield trials, without Imazamox applications (14 site-years), in
81 southeastern Idaho in 2001 and 2002, and in western and northern Idaho in
82 2002, Idaho 587, Stephens, Brundage 96, and 'Westbred 470' had average grain
83 yields of 7.2 Mg ha⁻¹, 7.2 Mg ha⁻¹, 6.8 Mg ha⁻¹, and 7.1 Mg ha⁻¹, respectively. In
84 the same trials Idaho 587, Stephens, Brundage 96, and Westbred 470 had
85 average test weights of 741 kg m⁻³, 744 kg m⁻³, 743 kg m⁻³, and 796 kg m⁻³,
86 respectively. These four cultivars were not found to differ significantly in their
87 lodging resistance. In a subset of these Idaho trials (11 site-years), Idaho 587
88 had similar grain yields to Madsen, 6.4 Mg ha⁻¹ and 6.3 Mg ha⁻¹, respectively.
89 Across nine locations, in Oregon extension testing, in 2002, Idaho 587,
90 Stephens, and Madsen had average grain yields of 5.7 Mg ha⁻¹, 5.5 Mg ha⁻¹, and
91 5.8 Mg ha⁻¹, respectively. In two sites across two years of milling evaluations in
92 Idaho, Idaho 587 had an average flour yield of 655 g kg⁻¹ of grain compared with
93 638 g kg⁻¹ for Stephens and 665 g kg⁻¹ for Madsen. Sugar snap cookie
94 evaluations of the same flour for Idaho 587 produced an average cookie
95 diameter of 8.5 cm compared with 8.1 cm for Stephens and 8.4 cm for Madsen.

96 Solvent retention capacity analysis of flour from Idaho 587 and Stephens
97 produced a sodium carbonate solvent retention of 643 g kg⁻¹ for Idaho 587, 661 g
98 kg⁻¹ for Stephens, and 629 g kg⁻¹ for Madsen. Lactic acid retention in the same
99 analyses of 800 g kg⁻¹ for Idaho 587, 940 g kg⁻¹ for Stephens, 794 g kg⁻¹ for
100 Madsen.

101 Foundation seed of Idaho 587 will be maintained by the Idaho Agricultural
102 Experiment Station and Plant Variety Protection sought for the cultivar. Idaho
103 587 carries a patented proprietary gene owned by BASF Corporation. Therefore,
104 it will be distributed only under a material transfer agreement in cooperation with
105 the BASF Corporation. Interested parties may contact the Idaho Research
106 Foundation, Moscow Idaho.

Director, Idaho Agricultural Experiment Station
Moscow, Idaho

Date

Director, Oregon Agricultural Experiment Station
Corvallis, Oregon

Date