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**REGISTRATION OF HIGH PROTEIN
WHEAT GERmplasm¹**
(Reg. Nos. GP 2 to GP 27)

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Twenty-six advanced experimental lines of wheat, *Triticum aestivum* L., C.I. numbers 13989 to 13992, 14014 to 14017, and 14057 to 14074 inclusive, trace to crosses made at Lincoln, Nebraska, in 1953. They were developed cooperatively by the Crops Research Division, Agricultural Research Service, U.S. Department of Agriculture and the Nebraska Agricultural Experiment Station. 'Atlas 66,' C.I. 12561, a soft red winter wheat developed by the North Carolina Agricultural Experiment Station, was utilized as the genetic source of high grain protein. The lines are being released to plant breeders as elite germplasm in 1970. Registration numbers GP 2 to GP 27 are identified with the germplasm lines in Table 1.

All lines have the winter habit of growth and were selected in early generations (F₂ to F₃) for high grain protein. Limited additional selection was practiced. High protein as used herein does not denote a fixed high protein level. Rather, it is based on observed superiority of the lines in grain protein content over their hard winter wheat parent in several years of Nebraska field trial. All lines have exhibited an average grain protein advantage over the hard wheat parent in the range of 2 to 3% actual protein at comparable grain yields. Known agronomic and quality traits of the lines are summarized in the tabulation.

The lines possess effective field resistance to leaf rust. The resistance is not expressed in the seedling stage. Close linkage of a gene conditioning leaf rust resistance with one promoting higher-than-normal protein from Atlas 66 is indicated by the leaf rust resistance of these and many other high protein, Atlas 66-derived lines from the ARS-Nebraska wheat protein improvement program. Our data point to the presence of a second gene for protein in the 27 lines included in this registration. Most of the lines exhibit a less-than-susceptible field reaction to stem rust. The reaction is not well defined and is influenced by infection intensity. In early stages of rust development there is pronounced pustule restriction and chlorosis-necrosis of surrounding tissue. Retardation of rust buildup provided by this reaction has, in most years, given protection against damage from stem rust as measured by yield and test weight of the grain.

Seven lines with 'Comanche' as one parent possess resistance to soil-borne mosaic. The other Comanche-derived lines were not tested for mosaic reaction. The lines are mostly mid-

Table 1. Characteristics of Atlas 66-derived winter wheat germplasm lines.

Reg. no.	C. I. no.	Protein content	Rust		Soil-borne mosaic	Winter hardiness	Maturity*	Spikelet
			Leaf	Stem				
Atlas 66/Comanche								
GP2	14014	High	R	S	--	Good	Mid-sea.	bd
GP3	14015	High	R	MR	MR	Fair	Mid-sea.	bd
GP4	14016	High	R	MR	R	Fair	Mid-sea.	bd
GP5	14017	High	R	MS	MR	Poor	Mid-sea.	bd
GP6	13989	High	R	MS	MR	Fair	Mid-sea.	bd
GP7	13990	High	R	MR	--	Poor	Late	bd
GP8	13991	High	R	MS	R	Fair	Mid-sea.	bd
GP9	13992	High	R	MR	--	Fair	Mid-sea.	bd
GP10	14057	High	R†	S	--	Poor	Mid-sea.	bd
GP11	14058	High	R	MS	--	Poor	Mid-sea.	bd
GP12	14059	High	R	MS	--	Fair	Mid-sea.	bd-bdl
GP13	14060	High	R	MR	MR	Good	Mid-sea.	bd
GP14	14061	High	R	MS	--	Fair	Mid-sea.	bdl
Atlas 66/Wichita								
GP15	14065	High	R†	MR	--	Fair	Mid-sea.	bd
GP16	14066	High	R	MS	--	Fair	Late	bd
GP17	14067	High	R	MS	--	Fair	Late	--
GP18	14068	High	R	MS	--	Fair	Early	--
GP19	14069	High	R†	MS	--	Fair	Early	--
GP20	14070	High	R	MS	--	Fair	Late	--
GP21	14071	High	R	MS	--	Fair	Mid-sea.	--
GP22	14072	High	R	MS	--	Fair	Late	--
GP23	14073	High	R	MR	--	Fair	Early	--
GP24	14074	High	R	MS	--	Fair	Early	--
Atlas 66/Comanche/Warrior								
GP25	14062	High	R†	MS	R	Fair	Mid-sea.	bd
GP26	14063	High	R	MS	--	Fair	Mid-sea.	bd
GP27	14064	High	R	MS	--	Fair	Mid-sea.	bd

* Mid-sea., = mid-season; m. ea. = moderately early
† bd = bearded; bdl = beardless.
‡ Predominantly resistant

season or later in maturity and tall. Their winterhardiness ranges from poor to good based on field survival at Nebraska stations. A rating of "good" indicates survival comparable to the hard winter parents Comanche and 'Wichita.' A "fair" rating indicates survival somewhat less, and the "poor" rating substantially less survival than these varieties. The Atlas 66 cultivar survives only in trace amounts at Lincoln, Nebraska. Kernel texture among the lines ranges from hard to soft. Bread-baking quality ranges from acceptable to poor among those lines for which quality information was obtained. The Atlas 66/Comanche and Atlas 66/Wichita lines have been less productive on the average than commercially grown cultivars in Nebraska, whereas the second breeding cycle lines involving 'Warrior' as a parent have been as productive as the popular 'Lancer' cultivar in station field trials since 1967.

These high protein winter wheats are released for use as parents in breeding programs. Seed of the lines is maintained at the Nebraska Agricultural Experiment Station, Lincoln, Nebraska, and by the Crops Research Division, Agricultural Research Service, USDA, (J. C. Craddock), Beltsville, Maryland. Germplasm amounts of seed are available from either repository upon request.

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