

Autotetraploid stocks and improved strains of tetraploid barley. W. Friedt. Department of Plant Genetics of the Gesellschaft für Strahlen- und Umweltforschung mbH., 8059 Grunbach, FRG.

The collection of autotetraploid barley stocks and their corresponding diploids were grown in the field in Grunbach in 1976 and different characters have been recorded as in previous years (see BGN 1, 1971, BGN 4, 1974, BGN 6, 1976). In Table 1, heading dates and various spike characters are summarized. A general impression of the differences in seed set between diploids and tetraploids is given by the frequency distributions of variety-means in Figure 1. In addition to the varieties listed, new autotetraploids have been induced. Limited amounts of seeds of the new strains are available.

Further progress has been made with respect to the improvement of seed set and vitality in our "Diploidisation Program" (see BGN 6, 1976, 103-108). In Table 2, the kernel yield and other yield components of seven selected strains of a trial with 32 variants plus four standard varieties are presented. The maximum increase in yield is 33% as compared to the four original autotetraploid varieties. The major contributors to this improvement are increased fertility and more extensive tillering. All of the 32 strains tested had more than 74% seed set and seven of them (=22%) exceeded 80%. Types of a comparable fertility level are not available in the autotetraploid collection (see Fig. 1). Floret number per spike and Thousandgrainweight (TGW) are higher than the controls in most cases, but not significant.

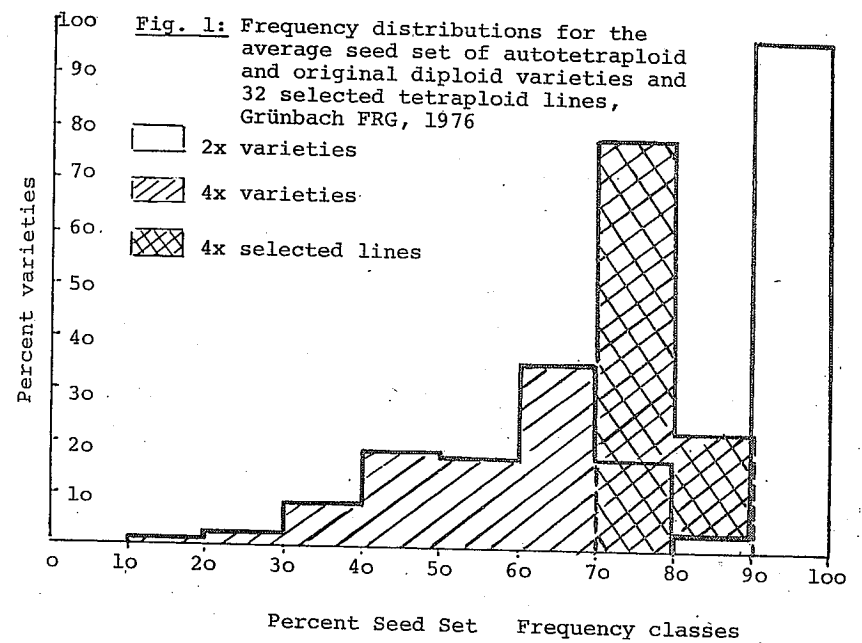


Table 1

Collection of autotetraploid stocks

Heading date and fertility 1976

Variety/Strain	Heading date	Florets/ Spike	Seeds/ Spike	Seed Set Percent
<u>Winter barley</u>				
4x Atlas (Gaul)		50,46	35,39	70,13
2x Atlas		47,20	44,05	93,32
4x Dayton (Wiebe)		44,80	27,06	60,40
2x Dayton		50,06	46,86	93,60
4x Dicktoo (Wiebe)		42,10	24,17	57,41
4x Hatif Boute (Oehler)		44,37	29,34	66,12
4x Hauters		53,10	34,20	64,40
2x Hauters		52,44	50,65	96,58
4x H.spontaneum var.trans- caspicum (Takahashi)		46,77	23,86	51,01
4x Kaukasus (Rommel)		42,50	25,46	59,90
2x Kleinwanzlebener		42,17	38,52	91,34
4x Ky (Craddock)		33,27	29,18	87,70
4x Mädrü		43,00	15,80	36,74
2x Mädrü		40,57	34,52	85,08
4x Missouri (Rommel)		49,65	26,10	52,56
2x Missouri		59,58	53,16	89,22
4x Riniken früh (Oehler)		36,80	14,26	38,75
4x Riniken normal (Oehler)		34,80	19,20	55,17
4x Riniken spät (Oehler)		39,60	25,26	63,78
2x Riniken		44,46	41,17	92,60
4x Tetra Smooth (Rommel)		45,40	33,43	73,63
4x Wong (Rommel)		49,09	26,18	53,33
2x Wong		48,91	35,39	92,80
<u>Spring barley</u>				
<u>6-rowed</u>				
4x 57 AB 5002 (Wiebe)	28.6.			
4x Baxbless (Wiebe)	27.6.			
4x Big Boy (Wiebe)	22.6.			
4x Brant (Jenkins)	20.6.	39,13	24,77	63,30
4x Brant x O.A.C.21 (Reinbergs)	19.6.	38,70	28,30	73,12

Variety/Strain	Heading date	Florets/ Spike	Seeds/ Spike	Seed Set Percent
Br 57-754 (Reinbergs)	20.6.	27,85	19,14	68,72
4x Br 57-754xGB 96 (Reinbergs)	19.6.	38,40	19,10	49,73
4x Brio (Müntzing)	20.6.	38,70	24,95	64,47
2x Brio	17.6.	58,65	56,60	96,50
4x Edda (Müntzing)	15.6.	43,50	30,75	70,68
4x Edda (Jenkins)	17.6.	44,25	26,30	59,43
2x Edda	14.6.	46,80	44,85	95,83
4x Everest (Wiebe)	19.6.	32,10	19,05	59,34
4x GB 96 (Reinbergs)	19.6.	38,40	24,75	64,45
4x Hoffmann 3520	21.6.	40,65	26,80	65,92
4x Hoffmann 3521	19.6.	32,70	19,45	59,48
4x Hoffmann 3522	19.6.			
4x Hoffmann 3524	19.6.	34,65	23,45	67,67
4x Hoffmann 10/634	19.6.	42,76	17,94	41,95
4x Hoffmann 11/344	14.6.	34,80	23,70	68,10
4x Hosogara Nr.2 (Takahashi)	22.6.	37,80	22,80	60,31
4x Hosomugi (Takahashi)	17.6.	41,64	30,64	73,58
4x Kihard Moshomugi (Müntzing)	15.6.	40,80	31,65	77,57
2x Kihara Moshomugi	20.6.	43,77	41,72	95,31
4x Kihara Saikon (Müntzing)	22.6.	40,05	26,95	67,29
2x Kihara Saikon	20.6.	46,21	45,25	98,13
4x Montcalm (Reinbergs)	15.6.	41,78	12,00	28,72
4x Nord (Reinbergs)	22.6.	42,60		63,38
4x O.A.C.21 (Reinbergs)	20.6.	43,20	28,20	65,27
4x O.A.C.21 (Jenkins)	19.6.	41,40	25,90	62,56
4x Stender (Wiebe)	19.6.	41,25	26,80	64,96
4x Traill (Reinbergs)	20.6.	39,15	17,75	45,33
4x Walter (Wiebe)	10.6.			
4x York (Reinbergs)	15.6.	34,95	14,80	42,34
4x York (Jenkins)	17.6.	36,45	15,20	41,70
<u>2-rowed</u>				
4x Alma	28.6.	21,20	14,30	67,45

Variety/Strain	Heading date	Florets/ Spike	Seeds/ Spike	Seed Set Percent
2x Alma	18.6.	24,00	23,65	98,54
4x Ammer (Frimmel)	28.6.	23,80	15,60	65,54
2x Ammer	21.6.	26,20	25,05	95,61
4x Amsel (Bender)	26.6.	22,90	15,70	68,55
2x Amsel	20.6.	24,35	23,70	97,33
4x Balder (Muntzing)	28.6.	21,25	7,25	34,11
4x Balder (Hoffmann)	23.6.	22,35	14,50	64,87
4x Balder (Lange)	28.6.	19,00	13,35	70,26
2x Balder	22.6.	22,50	20,05	89,11
4x Bella (Frimmel)	28.6.	20,65	12,35	59,80
2x Bella	22.6.	24,65	23,55	95,53
4x Bohemian (Wiebe)	29.6.	15,45	9,40	60,84
2x Bohemian	28.6.	20,50	19,25	93,90
4x Brage (Muntzing)	2.6.	20,50	9,70	47,31
4x Brage (Ellerström)	28.6.	20,90	10,35	49,52
2x Brage	22.6.	25,50	23,70	92,94
4x Busser (Bender)	28.6.	21,00	15,40	73,33
2x Busser	28.6.	24,40	23,40	95,90
4x Ceresia (Bender)	28.6.	19,95	15,50	77,69
2x Ceresia	20.6.	25,75	24,95	96,89
4x Cowra (Bender)	15.6.	18,15	13,00	71,62
2x Cowra	10.6.	18,15	17,25	95,04
4x D8/55 (Gaul)	25.6.	25,30	17,55	69,36
2x D8/55	20.6.	25,95	25,35	97,68
4x D9/55 (Gaul)	23.6.	23,45	16,70	71,21
2x D9/55	20.6.	26,30	25,10	95,43
4x Dioseger	28.6.	23,45	13,40	57,14
2x Dioseger	21.6.			
4x Emir (Frimmel)	28.6.	19,50	6,15	31,53
2x Emir	20.6.	22,80	21,90	96,05
4x ert 23 (Hoffmann)	1.7.	22,25	6,85	30,79
4x ert 32 (Hoffmann)	30.6.	21,05	8,85	42,04
4x ert 32 (Ellerström)	25.6.	21,45	7,90	36,83
2x ert 32	20.6.	27,35	23,75	86,84

Variety/Strain	Heading date	Florets/ Spike	Seeds/ Spike	Seed Set Percent
4x Firlbeck (Rommel)	28.6.	20,35	13,30	65,36
2x Firlbeck	21.6.	26,30	25,45	96,77
4x Frankonia	26.6.	24,50	16,75	68,37
2x Frankonia	21.6.	26,50	25,60	96,60
4x Fredrickson (Wiebe)	28.6.	24,15	15,75	65,22
4x Fuchs Pfälzer (Bender)	28.6.	24,70	14,80	59,92
2x Fuchs Pfälzer	21.6.	26,20	25,20	96,18
4x Gerda (Frimmel)	28.6.	23,90	14,35	60,04
2x Gerda	20.6.	21,55	21,15	98,14
4x Gold Foil (Rommel)	26.6.	22,50	13,55	60,22
2x Gold Foil	22.6.	27,95	26,20	93,74
4x Haisa II (Gaul)	26.6.	26,10	17,55	67,24
2x Haisa II	20.6.	25,60	24,60	96,09
4x dichte 11 (Gaul) ⁺	26.6.	22,05	15,55	70,52
4x macrolepis (Gaul) ⁺	28.6.	21,75	14,15	65,06
2x macrolepis ⁺	26.6.	25,75	24,70	95,92
4x w 7 (Gaul) ⁺	26.6.	22,90	15,05	72,01
2x w 7 ⁺	21.6.	25,95	25,30	97,50
4x frühe 31 (Gaul) ⁺	26.6.	26,15	17,85	68,26
2x frühe 31 ⁺	22.6.	26,20	25,30	96,56
4x frühe 58 (Gaul) ⁺	27.6.	23,35	16,25	69,59
4x lo 8 (Bender) ⁺	26.6.	23,00	16,20	70,43
2x lo 8 ⁺	20.6.	24,40	23,30	95,49
4x Harbin (Wiebe)	29.6.	21,20	11,45	54,01
2x Harlan	11.6.	14,25	13,20	92,63
2x Hatvany	23.6.	25,35	23,75	93,69
4x HES Type I (Takahashi)	10.6.	12,30	8,70	70,73
4x Hoffmann 3500	20.6.	16,70	9,25	55,39
4x Hoffmann 3501	21.6.	16,75	10,35	61,79
4x Hoffmann 3502	28.6.	14,50	2,00	13,79
4x Hoffmann 3503	21.6.	17,60	10,70	60,80
4x Hoffmann 3504	21.6.	17,55	10,75	61,25

Variety/Strain	Heading date	Florets/ Spike	Seeds/ Spike	Seed Set Percent
4x Hoffmann 35o5	19.6.	17,05	1o,8o	63,34
4x Hoffmann 35o6	19.6.			
4n Hoffmann 35o7	21.6.	16,5o	7,05	42,73
4x Hoffmann 35o8	21.6.	16,15	9,05	56,04
4x Hoffmann 35o9	2o.6.	16,15	8,9o	55,11
4x Hoffmann 351o	19.6.	17,55	1o,6o	6o,4o
4x Hoffmann 3511	21.6.	18,6o	11,25	6o,48
4x Hoffmann 3512	21.6.	18,05	1o,6o	58,73
4x Hoffmann 3513	21.6.	18,7o	1o,8o	57,75
4x Hoffmann 3514	22.6.	19,15	1o,4o	54,31
4x Hoffmann 3515	2o.6.	18,44	8,2o	44,47
4x Hoffmann 3516	21.6.	21,15	13,55	64,07
4x Hoffmann 3517	2o.6.	22,75	17,0o	74,73
4x Hoffmann 3518	21.6.	19,15	8,8o	45,95
4x Hoffmann 3519	2o.6.	21,2o	12,25	57,78
4x Hoffmann 11/344-27	2o.6.	21,12	1o,24	48,48
4x Impala (Frimmel)	25.6.	23,4o	16,1o	68,8o
2x Impala	21.6.	27,3o	26,2o	95,97
4x Ingrid (Frimmel)	3o.6.	2o,9o	9,75	46,65
2x Ingrid	21.6.	24,2o	23,6o	97,52
4x Inis (Frimmel)				
2x Inis	2o.6.	26,05	24,65	94,62
4x Johanna (Frimmel)	25.6.	21,95	16,4o	74,71
2x Johanna	2o.6.	26,4o	25,1o	95,07
4x Kenia (Müntzing)	22.6.	2o,8o	8,7o	41,82
4x Kenia (Hoffmann)	23.6.	2o,25	7,0o	34,56
2x Kenia	2o.6.	23,05	21,6o	93,7o
4x Kihara early golden (Müntzing)	18.6.	15,25	11,05	72,45
2x Kihara early golden	14.6.	17,05	16,15	94,72
4x Kihara Hakata (Müntzing)	16.6.	24,05	15,55	64,65
2x Kihara Hakata	13.6.	25,1o	23,6o	94,02
4x Kihara Hakata 2 (Wiebe)	16.6.	23,75	15,9o	66,94

Variety/Strain	Heading date	Florets/ Spike	Seeds/ Spike	Seed Set Percent
4x Maja (Müntzing)	28.6.	27,0o	13,75	5o,92
4x Maja (Hoffmann)	27.6.	21,4o	13,65	63,78
2x Maja	26.6.	25,55	23,8o	93,15
4x Mamie (Frimmel)	23.6.	23,45	12,05	51,38
2x Mamie	19.6.	23,55	22,8o	96,81
4x Mari (Frimmel)	15.6.	17,4o	9,5o	54,59
2x Mari	13.6.	17,55	16,7o	95,15
4x Matura (Frimmel)	26.6.	22,25	12,0o	53,93
2x Matura	21.6.	25,65	24,65	96,1o
4x NS Morgenrot (Frimmel)	16.6.	17,65	12,4o	7o,25
2x NS Morgenrot	12.6.	21,85	2o,15	92,21
4x New Ebis (Wiebe)	28.6.	19,35	14,05	72,6o
4x Nota (Frimmel)	28.6.	19,35	12,7o	65,63
2x Nota	21.6.	24,25	23,0o	94,84
4x Ochsenhauer Ria (Bender)	26.6.	19,15	5,05	26,37
2x Ochsenhauer Ria	25.6.	22,1o	21,1o	95,47
4x Opal B (Müntzing)	25.6.	16,22	5,88	36,25
4x Opal B (Wiebe)	26.6.	19,85	5,4o	27,2o
2x Opal B	21.6.	24,25	22,1o	91,31
4x Palmella blue (Frimmel)	2o.6.	16,5o	7,8o	47,27
2x Palmella blue	15.6.	19,1o	17,3o	9o,57
4x Primus II (Müntzing)	28.6.	2o,5o	11,05	53,9o
4x Primus II (Ellerström)	26.6.	21,15	1o,45	49,4o
2x Primus II	25.6.	28,2o	26,6o	94,32
4x Scholz mut. 4242 (Bender)	24.6.	19,42	9,42	48,5o
2x Scholz mut. 4242	15.6.	23,25	22,7o	97,63
4x Skärsmö (Müntzing)	23.6.	2o,1o	7,8o	38,8o
2x Skärsmö	16.6.	23,2o	22,35	96,33
4x Shin Ebisu (Takahashi)	19.6.	15,25	1o,05	65,9o
4x Stankas früh (Frimmel)	16.6.	17,15	11,6o	67,63
2x Stankas früh	13.6.	19,7o	18,8o	95,43
4x Starnauer Kneifel (Bender)	24.6.	23,75	16,9o	71,15
2x Starnauer Kneifel	19.6.	27,4o	26,6o	97,08

Variety/Strain	Heading date	Florets/ Spike	Seeds/ Spike	Seed Set Percent
4x Strengs Franken III (Rommel)	25.6.	23,90	16,15	67,57
2x Strengs Franken III	20.6.	30,50	29,00	95,08
4x Szekacs	21.6.	20,15	8,40	41,68
2x Szekacs	20.6.	22,70	21,55	94,93
2x Trins	25.6.	28,60	26,70	93,35
4x Ulonska nackt	23.6.	22,30	15,90	71,30
4x Ulonska 41/18	28.6.	24,85	16,60	66,80
4x Ulonska 41/65	23.6.	22,65	16,85	74,39
4x Union (Bender)	28.6.	19,70	10,35	52,53
2x Union	25.6.	23,45	22,05	94,03
4x Villa (Friedt)	28.6.	22,90	13,20	57,64
2x Villa	22.6.	22,60	21,05	93,14
4x Volla (Frimmel)	28.6.	15,90	8,75	55,03
2x Volla	21.6.	23,30	22,45	96,35
4x Wasegoru (Takahashi)	20.6.	13,00	8,50	65,38
4x Weihensteph. Mehlttaures. (Gaul)	25.6.	21,65	15,65	72,28
2x Weihenst. Mehlttauresistente	21.6.	24,90	23,85	95,78
4x Wisa (Rommel)	25.6.	23,90	16,00	66,94
2x Wisa	21.6.	23,50	21,45	91,27
4x Ymer (Müntzing)	26.6.	22,10	10,45	47,28
4x Ymer (Ellerström)	28.6.	25,00	9,25	37,00
4x Ymer (Hoffmann)	25.6.	19,25	9,05	47,01
2x Ymer	20.6.	24,45	22,75	93,04
4x B 1173/472311 (Frimmel)	26.6.	20,30	13,40	66,00
2x B 1173/472311	12.6.	21,35	20,15	94,37
4x K 1749/13681 (Frimmel)	25.6.	18,80	11,05	58,77
2x K 1749/13681	20.6.	20,90	19,75	94,49
4x 48/711d (Frimmel)	25.6.	19,65	13,40	68,19
2x 48/711d	19.6.	22,85	22,05	96,49
4x 50/721c (Frimmel)	25.6.	18,80	14,20	75,53
2x 50/721c	20.6.	22,80	21,75	95,39
4x 79/755-15 (Frimmel)	24.6.	19,25	12,10	62,85
2x 79/755-15	21.6.	22,15	21,45	96,83

Variety/Strain	Heading date	Florets/ Spike	Seeds/ Spike	Seed Set Percent
4x 79/756-12 (Frimmel)	3.7.	19,65	9,30	47,32
2x 79/756-12	28.6.	20,30	19,15	94,33
4x 90/771-21 (Frimmel)	28.6.	19,65	9,00	45,80
2x 90/771-21	20.6.	25,05	24,30	97,00
4x 90/772/1 (Frimmel)	28.6.	25,95	9,10	43,43
2x 90/772/1	21.6.	23,75	22,70	95,57
4x 297/1347 (Frimmel)	28.6.	22,40	11,00	49,10
2x 297/1347	25.6.	23,90	23,00	96,23
4x 478/1370 (Frimmel)	30.6.	23,05	5,00	21,69
2x 478/1370	20.6.	22,70	21,95	96,69
2x No. 5508 (Frimmel)	17.6.	23,75	22,15	93,26
4x 744/1277 (Friedt)	28.6.	20,20	6,35	31,43
2x 744/1277	25.6.	22,15	21,60	97,51
4x 744/1277 lo (Friedt)	27.6.	19,65	7,35	37,40
2x 744/1277 lo	21.6.	23,85	22,75	95,38
4x 744/1277 steril	26.6.	25,05	18,40	73,45
4x 548/1812 (Friedt)	26.6.	22,75	11,15	49,01
2x 548/1812	22.6.	22,95	21,50	93,68
4x MRM 52 (Friedt)	19.6.	21,35	13,55	63,46
2x MRM 52	16.6.	24,80	23,90	96,37
4x Carina (Friedt)	27.6.	21,70	13,00	59,90
2x Carina	22.6.	24,15	23,20	96,06

+) mutant of "Haisa II"

Table 2: Kernel Yield and Yield Components of tetraploid selected strains, 1976

Strain	Tillering		Florets/Spike		Seeds/Spike		Percent Seed Set		TGW		Kernel Yield	
	abs.No. rel. l)	abs.No. rel. l)	abs.No. rel. l)	abs.No. rel. l)	abs.No. rel. l)	abs.No. rel. l)	abs. % rel. l)	abs. % rel. l)	abs.g rel. l)	abs.g rel. l)	abs.g rel. l)	abs.g rel. l)
600875	227,0	124,0	18,5	97,0	13,9	103,8	75,5	107,2	58,8	110,1	1481,7	124,5
601475	232,0	126,9	20,9	109,6	16,7	124,3	80,0	113,6	54,3	101,6	1589,7	133,5
601775	189,3	103,4	19,7	103,3	15,8	117,8	80,5	114,3	55,3	103,6	1458,3	122,5
603675	185,3	101,2	20,5	107,5	15,8	117,8	77,3	109,7	54,5	102,0	1454,7	122,2
603875	204,0	111,4	20,2	106,0	15,5	115,6	76,8	109,1	53,1	99,4	1509,3	126,8
603975	210,3	114,9	21,0	110,4	15,7	117,2	74,9	106,3	53,4	100,0	1455,7	122,3
604175	202,0	110,3	21,1	110,9	16,2	120,8	76,8	109,0	52,9	99,1	1499,0	125,9

l)

Relative values: 100 = Average of four 4x Control varieties

* Difference to 4x Control varieties significant at $p < 0,5$

** Difference to 4x Control varieties significant at $p < 0,1$

*** Difference to 4x Control varieties significant at $p < 0,01$

VIII. LIST OF RECENT PUBLICATION ON BARLEY GENETICS

VIII.1 1975 Publications

- Ahokas, H. 1975. Male sterile mutants of barley. I. In aperturate pollen of msg 6 cf mutant. *Ann. Bot. Fennici* 12:17-21.
- Ahokas, H. 1975. Male sterile mutants of barley. II. Cytochemistry of non-mutant and msg 6 cf microspores and pollen. *Hereditas* 81:33-46.
- Ali, S.M. 1975. Inheritance of scald resistance in barley. I. Resistance genes of group A barley cultivars. *Aust. J. Agric. Res.* 26:243-250.
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