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HIGH MOLECULAR WEIGHT GLUTENIN SUBUNIT COMPOSITION OF 167 ACCESSIONS OF *TRITICUM TURGIDUM* VAR. *DICOCCUM* FROM THE U.S.D.A. SMALL GRAINS COLLECTION

by V. VALLEGA and J.G. WAINES

In *Triticum aestivum* L. (genome AABBDD) as well as in *T. turgidum* L. (AABB), the genes coding for the high molecular weight (HMW) subunits of glutenin occur at three (or two) complex loci (*Glu-A1, Glu-B1* and *Glu-D1)* situated on homoeologous group-1 chromosomes (Bietz *et al.*, 1975; Lawrence and Shepherd, 1981). Variation in HMW glutenin subunit composition, as evidenced by SDS-PAGE, has proved useful for cultivar identification purposes (Wagner and Maier, 1982; Pogna *et al.* 1985; Vallega, 1986) and may furnish an additional tool for the characterization of germplasm collections (Vallega and Mello-Sampayo, 1987). Indeed, a recent survey conducted on 167 accessions of dicoccum wheat (*T. turgidum* L. var. *dicoccum* Shrank) from the U.S.D.A. Small grains collection (Vallega and Waines, 1987) allowed the identification of 20 *Glu-1* alleles, including 9 that were different from those identified by Payne and Lawrence (1983) in hexaploid wheat, and 29 different allelic combinations. Additional information regarding this survey is presented below. The data provided should also facilitate studies on the relationship (Payne *et al.*, 1979) between HMW glutenin subunit composition and bread-making quality of wheats.

Table 1 list the dicoccum strains examined and the *Glu-A1* and *Glu-B1* alleles carried by each entry. Accession numbers correspond to those of the U.S.D.A. Small Grains Collection maintained at Beltsville (U.S.A.). Alleles are designated with alphabetical characters

(Payne and Lawrence, 1983) or with Roman numerals (novel variants; Vallega and Waines, 1987). Only one or two grains of each dicoccum accession were fractionated by SDS-PAGE.

As can be seen in table 2, greatly diversified HMW glutenin patterns were observed especially amongst *dicoccums* from the U.S.S.R., Germany, Syria and Turkey, but not in those from Spain and Yugoslavia. Duplication on entries and/or sampling deficiencies during the wheat collecting process probably account for the lack of variation observed amongst wheats from the latter countries.

Table 1. — *Glu-A1* and *Glu-B1* alleles in 167 *Triticum dicoccum accessions*

U.S.D.A. accession numbers	Alleles		Countries of *origin*
	Glu-A1	*Glu-B1*	
P.I. 94613	a	IV	Saudi Arabia
P.I. 94614	a	VI	U.S.S.R.
P.I. 94615	c	VI	U.S.S.R.
P.I. 94616	b	d	U.S.S.R.
P.I. 94617	b	d	U.S.S.R.
P.I. 94618	a	h	U.S.S.R.
P.I. 94620	c	VI	U.S.S.R.
P.I. 94621	a	k	U.S.S.R.
P.I. 94623	a	V	Iran
P.I. 94624	a	h	Iran
P.I. 94625	a	V	Iran
P.I. 94626	III	d	Turkey
P.I. 94627	III	d	Turkey
P.I. 94628	a	h	India
P.I. 94630	c	III	Ethiopia
P.I. 94631	c	h	Ethiopia
P.I. 94632	c	h	Ethiopia
P.I. 94633	a	V	Morocco
P.I. 94634	c	h	Morocco
P.I. 94635	a	~~VI~~	Iran
P.I. 94637	c	III	Iran
P.I. 94638	c	VI	Iran
P.I. 94640	a	I	Iran
P.I. 94641	a	IV	Germany
P.I. 94648	b	IV	Italy
P.I. 94655	c	IV	Bulgaria
P.I. 94656	a	h	Yugoslavia
P.I. 94657	b	IV	Yugoslavia
P.I. 94659	III	IV	Bulgaria
P.I. 94660	b	d	U.S.S.R.
P.I. 94661	a	VI	U.S.S.R.
P.I. 94665	a	I	Ethiopia
P.I. 94666	a	I	U.S.S.R.
P.I. 94667	c	VI	U.S.S.R.
P.I. 94668	c	I	U.S.S.R.
P.I. 94669	c	VI	Bulgaria
P.I. 94670	a	V	Iran
P.I. 94671	c	III	Afghanistan
P.I. 94673	a	b	U.S.S.R.
P.I. 94674	a	k	U.S.S.R.

Segue Table 1. — *Glu-A1* and *Glu-B1* alleles in 167 *Triticum dicoccum* accessions

U.S.D.A. accession numbers	Alleles		Countries of *origin*
	Glu-A1	*Glu-B1*	
P.I. 94675	a	I	U.S.S.R.
P.I. 94676	a	h	U.S.S.R.
P.I. 94677	a	h	U.S.S.R.
P.I. 94678	a	h	Iran
P.I. 94680	a	II	Germany
P.I. 94682	a	VI	Greece
P.I. 94683	I	II	U.S.S.R.
P.I. 217637	a	h	India
P.I. 217639	a	h	India
P.I. 217640	a	h	India
P.I. 217670	a	b	Spain
P.I. 217671	a	b	Spain
P.I. 217672	a	b	Spain
P.I. 310471	a	IV	India
P.I. 319868	c	III	Turkey
P.I. 319869	c	h	Turkey
P.I. 349043	a	k	U.S.S.R.
P.I. 349045	c	I	U.S.S.R.
P.I. 349046	a	VI	U.S.S.R.
P.I. 350000	b	IV	Yugoslavia
P.I. 350001	b	j	Yugoslavia
P.I. 352329	b	d	Switzerland
P.I. 352330	III	VI	U.S.S.R.
P.I. 352331	a	VI	U.S.S.R.
P.I. 352333	III	d	Germany
P.I. 352336	a	b	Spain
P.I. 352337	a	b	Spain
P.I. 352338	a	b	Spain
P.I. 352341	a	b	Spain
P.I. 352342	a	b	Spain
P.I. 352343	a	VI	U.S.S.R.
P.I. 352344	a	b	Spain
P.I. 352346	a	d	Spain
P.I. 352348	III	d	Syria
P.I. 352351	a	d	Turkey
P.I. 352352	III	a	Turkey
P.I. 352353	a	VI	U.S.S.R.
P.I. 352354	a	III	Ethiopia
P.I. 352355	c	III	Ethiopia
P.I. 352357	III	d	Israel

Segue Table 1. — *Glu-A1* and *Glu-B1* alleles in 167 *Triticum dicoccum* accessions

U.S.D.A. accession numbers	Alleles		Countries of *origin*
	Glu-A1	*Glu-B1*	
P.I. 352358	a	II	France
P.I. 352359	III	d	Germany
P.I. 352361	a	b	Italy
P.I. 352362	a	b	Italy
P.I. 352363	a	IV	Italy
P.I. 352365	a	II	U.S.S.R.
P.I. 352366	a	a	U.S.S.R.
P.I. 352367	III	d	Israel
P.I. 355460	a	II	Switzerland
P.I. 355461	a	II	Germany
P.I. 355464	a	II	Belgium
P.I. 355465	a	II	Belgium
P.I. 355467	a	II	Germany
P.I. 355468	a	j	Germany
P.I. 355470	a	h	Germany
P.I. 355471	a	d	Syria
P.I. 355472	c	II	Germany
P.I. 355473	a	a	Germany
P.I. 355474	a	a	Syria
P.I. 355476	a	II	Belgium
P.I. 355478	a	III	Syria
P.I. 355479	b	d	Syria
P.I. 355480	a	VI	Syria
P.I. 355482	a	b	Spain
P.I. 355483	a	b	Spain
P.I. 355484	a	b	Spain
P.I. 355485	a	b	Spain
P.I. 358486	a	b	Spain
P.I. 358487	a	II	Italy
P.I. 355488	a	d	Italy
P.I. 355489	a	II	Germany
P.I. 355490	a	IV	Czechoslovakia
P.I. 355491	a	IV	Italy
P.I. 355492	a	VI	Germany
P.I. 355493	a	VI	Germany
P.I. 355494	III	d	Belgium
P.I. 355495	a	d	Germany
P.I. 355496	a	d	Germany
P.I. 355497	III	d	Germany
P.I. 355498	III	VI	Syria

Segue Table 1. — *Glu-A1* and *Glu-B1* alleles in 167 *Triticum dicoccum* accessions

U.S.D.A. accession numbers	Alleles		Countries of *origin*
	Glu-A1	*Glu-B1*	
P.I. 355499	a	d	Belgium
P.I. 355500	a	d	Germany
P.I. 355501	a	d	Belgium
P.I. 355502	a	d	Germany
P.I. 355504	III	VI	Italy
P.I. 355505	a	II	Germany
P.I. 377651	b	IV	Yugoslavia
P.I. 377652	b	IV	Yugoslavia
P.I. 377653	b	IV	Yugoslavia
P.I. 377655	b	IV	Yugoslavia
P.I. 377658	b	IV	Yugoslavia
P.I. 377659	b	IV	Yugoslavia
P.I. 377660	b	IV	Yugoslavia
P.I. 377661	b	IV	Yugoslavia
P.I. 377663	b	IV	Yugoslavia
C.I. 2337	III	VI	France
C.I. 3852	a	IV	India
C.I. 4572	a	g	U.S.S.R.
C.I. 4573	b	d	U.S.S.R.
C.I. 7042	b	d	Portugal
C.I. 7181	c	II	U.S.S.R.
C.I. 7276	c	d	Ethiopia
C.I. 7685	a	b	U.S.S.R.
C.I. 7686	b	d	U.S.S.R.
C.I. 7687	a	VI	U.S.S.R.
C.I. 7779	a	k	Ethiopia
C.I. 7814	c	III	Ethiopia
C.I. 7816	c	h	Ethiopia
C.I. 7966	c	III	Ethiopia
C.I. 8641	c	III	Ethiopia
C.I. 8642	c	III	Ethiopia
C.I. 8644	c	III	Ethiopia
C.I. 8645	c	III	Ethiopia
C.I. 9258	a	VI	U.S.S.R.
C.I. 9309	a	e	U.S.S.R.
C.I. 9311	a	VI	U.S.S.R.
C.I. 10123	b	d	China
C.I. 12213	II	IV	India
C.I. 12214	a	h	India
C.I. 14098	c	III	Ethiopia

Segue Table 1. — *Glu-A1* and *Glu-B1* alleles in 167 *Triticum dicoccum* accessions

U.S.D.A. accession numbers	Alleles		Countries of *origin*
	Glu-A1	*Glu-B1*	
C.I. 14592	c	h	Ethiopia
C.I. 14621	c	III	Ethiopia
C.I. 14636	c	III	Ethiopia
C.I. 14637	c	III	Ethiopia
C.I. 14638	c	III	Ethiopia
C.I. 14639	c	III	Ethiopia
C.I. 14750	c	d	Ethiopia

Table 2. — Highmolecular-weight glutein patterns of 167 *Triticum dicoccum* accessions by country of origin

Countries of origin	No. of accessions examined	No. of HMW glutenin patterns
Afghanistan	1	1
Belgium	6	3
Bulgaria	3	3
Czechoslovakia	1	1
China	1	1
Ethiopia	23	6
France	2	2
Germany	19	9
Greece	1	1
India	8	3
Iran	9	5
Israel	2	1
Italy	8	5
Morocco	2	2
Portugal	1	1
Saudi Arabia	1	1
Spain	15	2
Switzerland	2	2
Syria	7	7
Turkey	6	5
USSR	36	15
Yugoslavia	13	3
	167	(29)

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