

( )

*Aegilops crassa* (HMW-GS)

\*

( / / : // : )

(HMW-GS)

(2n=6x=42)

(2n=4x=28)

*Aegilops crassa*

SDS-PAGE

/ +

*Glu-D<sup>cr1</sup>*

/ +

T2

D

M

D

*Ae. crassa*

*Aegilops crassa* :

.(Pena et al., 1995)

(Ciaffi et al., 1993; Metakovsky & Baboev, 1992;  
.Smith-Huerta et al., 1989)

.(Vojdany, 2003)

(Ciaffi et al., 1993;  
Metakovsky & Baboev, 1992; Nevo et al., 1982;  
.Nevo & Payne, 1987)

(Jiang et al., 1994;

Knott & Dvorak, 1976; Nevo & Payne, 1987;  
Smith-Herta et al., 1989)

*Ae. crassa* Bioss

( $2n=4x=28$ ,  $M^{cr}M^{cr}D^{cr1}D^{cr1}$ )

( $2n=6x=42$ ,  $M^{cr}M^{cr}D^{cr1}D^{cr1}D^{cr2}D^{cr2}$ )

(Najafian & Abdmishani, 1997)

*Ae. crassa*

*Ae. tauschii* *Ae. crassa*

(Bahraee, 2003; Ciaffi et al.,  
1993; Lafiandra et al., 1993; Payne et al., 1983)

*Ae. crassa*

*Ae. tauschii* *Ae. crassa*  $D^{cr1}$

(Aghaei, 1995; Ciaffi et al.,  
Ciaffi et al., 1993; Gill et al., 1993)  
(William & Mujeeb-al., 1991)  
(Aghaei, Kazi, 1995)  
1995; Babaei, 1996; Blackman & Payne, 1987;  
Najafian & Abdmishani, 1997)  
(Bahraee, 2003; Ciaffi et al., 1993;  
Nevo et al., 1982; Nevo & Payne, 1987; William et  
al., 1993)

*Ae. crassa*

*Ae. crassa*

(SDS)

(Jiang et al., 1994; Najafian &  
Abdmishani, 1997)

(HMW)

*Ae. tauschii*

D

(Payne et al., 1983)

HMW

*Glu-B1* *Glu-A1*

(William & Mujeeb-Kazi, 1995)

*Glu-D1*

...

(Y) (X)

*Ae. crassa*

HMW X Y *Glu-D1*

X *Glu-A1*

*Glu-B1*

X

Y X

*Ae. crassa*

( ) ( ) ( ) (Najafian & Abdmishani, 1997; Payne et al., 1983; Payne et al., 1980; Pena et al., 1995)

( ) ( ) ( )

( )

( )

( ) *Glu-D1*

( )

*Chinese spring,*

*Ae. tauschii*

نيز sunbri, sunvale, grebe Laguddh

– HMW (1989) & Halloran

*Ae. tauschii*

*Glu-D1*

T2 ,11 ,5.1

Mohammadi & Ahmadian

– HMW (1998)

*Ae. tauschii*

(1970) Laemmler

(1983) Fulinvgton et al.

*Glu-D1*

–HMW

(1988) Laguddh & Halloran *Ae. crassa*

(1983) Payne et al. (1993) William et al.

(1998) Mohammadi & Ahmadian

*Triticum tauschii* (Knott & Dvorak, 1976)

*Ae. crassa*

NTSYS

(PCOA)

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*Ae. crassa*

No.				No.			
1	TN00287	unknown1	4X	61	TN01241	Azarbaijan G8	4X
2	TN00300	Kordestan1	4X	62	TN01242	Azarbaijan G9	4X
3	TN00343	unknown2	4X	63	TN01247	Bakhtaran19	4X
4	TN00365	Lorestan1	4X	64	TN01272	Azarbaijan G10	4X
5	TN00381	Hamedan1	4X	65	TN01282	Azarbaijan G11	4X
6	TN00384	Hamedan2	4X	66	TN01285	Azarbaijan G12	4X
7	TN00386	unknown3	4X	67	TN01294	Azarbaijan G113	4X
8	TN00473	unknown4	4X	68	TN01298	Azarbaijan G14	4X
9	TN00539	unknown5	4X	69	TN01300	Azarbaijan G15	4X
10	TN00598	Khorasan1	4X	70	TN01301	Azarbaijan G16	6X
11	TN00675	Hamedan3	4X	71	TN01317	Hamedan4	4X
12	TN00684	Zanjan1	4X	72	TN01321	Hamedan5	4X
13	TN00689	Zanjan2	4X	73	TN01326	Hamedan6	4X
14	TN00714	unknown6	4X	74	TN01327	Hamedan7	4X
15	TN00720	Fars1	4X	75	TN01334	Kordestan2	4X
16	TN00721	Fars2	4X	76	TN01341	Khorasan3	6X
17	TN00723	Fars3	4X	77	TN01347	Khorasan4	6X
18	TN00724	Fars4	4X	78	TN01355	Khorasan5	6X
19	TN00730	Fars5	4X	79	TN01384	Zanjan3	4X
20	TN00744	Fars6	6X	80	TN001398	unknown9	4X
21	TN00757	Ilam1	4X	81	TN01473	Azarbaijan G17	4X
22	TN00758	Ilam2	4X	82	TN01485	Azarbaijan G18	4X
23	TN00763	Ilam3	4X	83	TN01490	Azarbaijan G19	4X
24	TN00778	Ilam4	4X	84	TN01508	Kermanshah 20	4X
25	TN00779	Ilam5	4X	85	TN01511	Kermanshah 21	4X
26	TN00789	Ilam6	4X	86	TN01522	Kermanshah 22	4X
27	TN00791	Ilam7	4X	87	TN01536	Kermanshah 23	4X
28	TN00792	Ilam8	4X	88	TN01538	Kermanshah 24	4X
29	TN00794	Ilam9	6X	89	TN01680	Fars7	4X
30	TN00885	Azarbaijan G1	4X	90	TN01698	unknown10	4X
31	TN00908	Kermanshah 1	6X	91	TN01699	Tehran	4X
32	TN00911	Kermanshah 2	6X	92	TN01742	Hamedan8	4X
33	TN00944	Kermanshah 3	4X	93	TN01744	Khuzestan	4X
34	TN00947	Kermanshah 4	4X	94	1948	unknown11	4X
35	TN00948	Kermanshah 5	4X	95	TN01972	Zanjan4	4X
36	TN00966	Kermanshah 6	4X	96	TN02053	Azarbaijan G20	4X
37	TN00972	Kermanshah 7	4X	97	TN02060	Azarbaijan G21	6X
38	TN00973	Kermanshah 8	4X	98	TN02063	Azarbaijan G22	4X
39	TN00976	Kermanshah 9	4X	99	TN02066	Azarbaijan G23	4X
40	TN00977	Kermanshah 10	4X	100	TN02112	Kordestan6	4X
41	TN00995	Chaharmohale B	4X	101	TN02113	Kordestan7	4X
42	TN01012	Hormozgan1	4X	102	TN02117	Khorasan8	4X
43	TN01015	Hormozgan2	4X	103	50117	unknown12	4X
44	TN01046	Azarbaijan G2	4X	104	50119	Khorasan2	4X
45	TN01055	Azarbaijan G3	4X	105	50122	unknown13	6X
46	TN01063	Azarbaijan G4	4X	106	50131	Khorasan3	6X
47	TN01065	Azarbaijan G5	4X	107	50135	Khorasan4	6X
48	TN01068	Azarbaijan G6	4X	108	50140	unknown14	4X
49	TN01101	Kermanshah11	6X	109	50141	unknown15	4X
50	TN01107	Kermanshah 12	4X	110	50174	Kermanshah 25	6X
51	TN01139	Kermanshah 3	4X	111	50185	unknown16	4X
52	TN01141	Kermanshah 14	4X	112	50019	Markazi1	4X
53	TN01145	Kermanshah 15	6X	113	50021	Markazi2	4X
54	TN01151	Kermanshah 16	4X	114	50027	unknown17	4X
55	TN01158	Kermanshah 17	4X	115	50034	Lorestan2	4X
56	TN01166	Kermanshah 18	4X	116	50040	Kermanshah 26	6X
57	TN01187	Azarbaijan S1	4X	117	50042	Kordestan9	4X
58	TN01196	unknown7	4X	118	50066	Azarbaijan G24	4X
59	TN01194	unknown8	4X	119	50067	Azarbaijan G25	6X
60	TN01236	Azarbaijan G7	4X	120	50092	Azarbaijan S2	4X

Laguddh &

12 10

(1988) Halloran

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10.5

(1983) William et al.

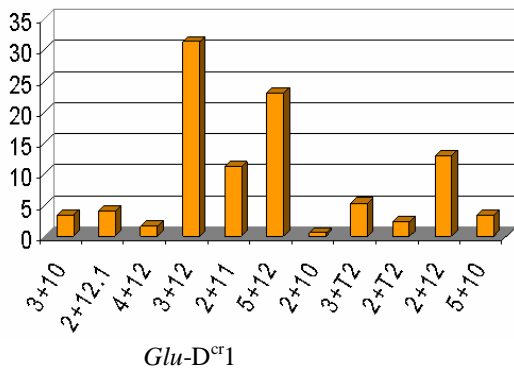
(1988) Laguddh & Halloran

T<sub>2</sub>

*T. tauschii*

-HMW

12



*Glu-D<sup>cr1</sup>*

*Ae. crassa*

T<sub>2</sub>

3+T<sub>2</sub> 2+T<sub>2</sub>

T<sub>1</sub>

(1983) William et al.

T<sub>2</sub>

11

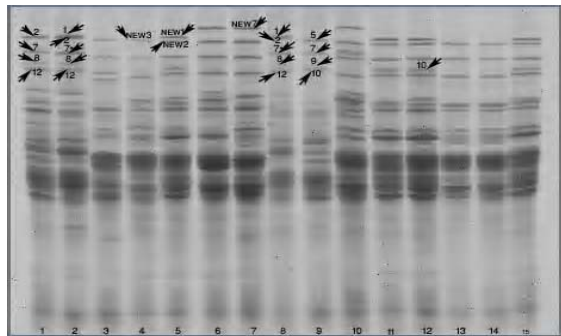
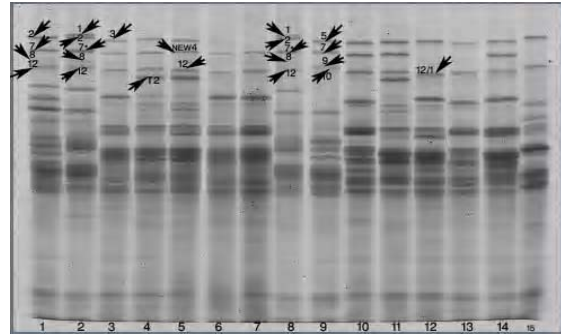
Laguddh &

(1989) Halloran

Mackie

T<sub>2</sub>, T<sub>1</sub>  
(1996) et al.

*Ae. crassa*



*Ae. crassa*

(Sunbri) 2 (Chinese Spring)1

(Sunvale) 9 (Grebe) 8

( ) (TN01294) (TN00381)

(TN01300)

(TN01341) (TN00758)

( ) (TN00794)

*Ae. crassa*

*Glu-D<sup>cr1</sup>*

T<sub>1</sub>

-HMW

Y X

*Glu-D<sup>cr1</sup>*

/

X

T<sub>2</sub>

Y

T<sub>2</sub> 11

*Glu-D*<sup>cr1</sup>

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(2003) Bahraee .

*T. urartu* *T. boeoticum*

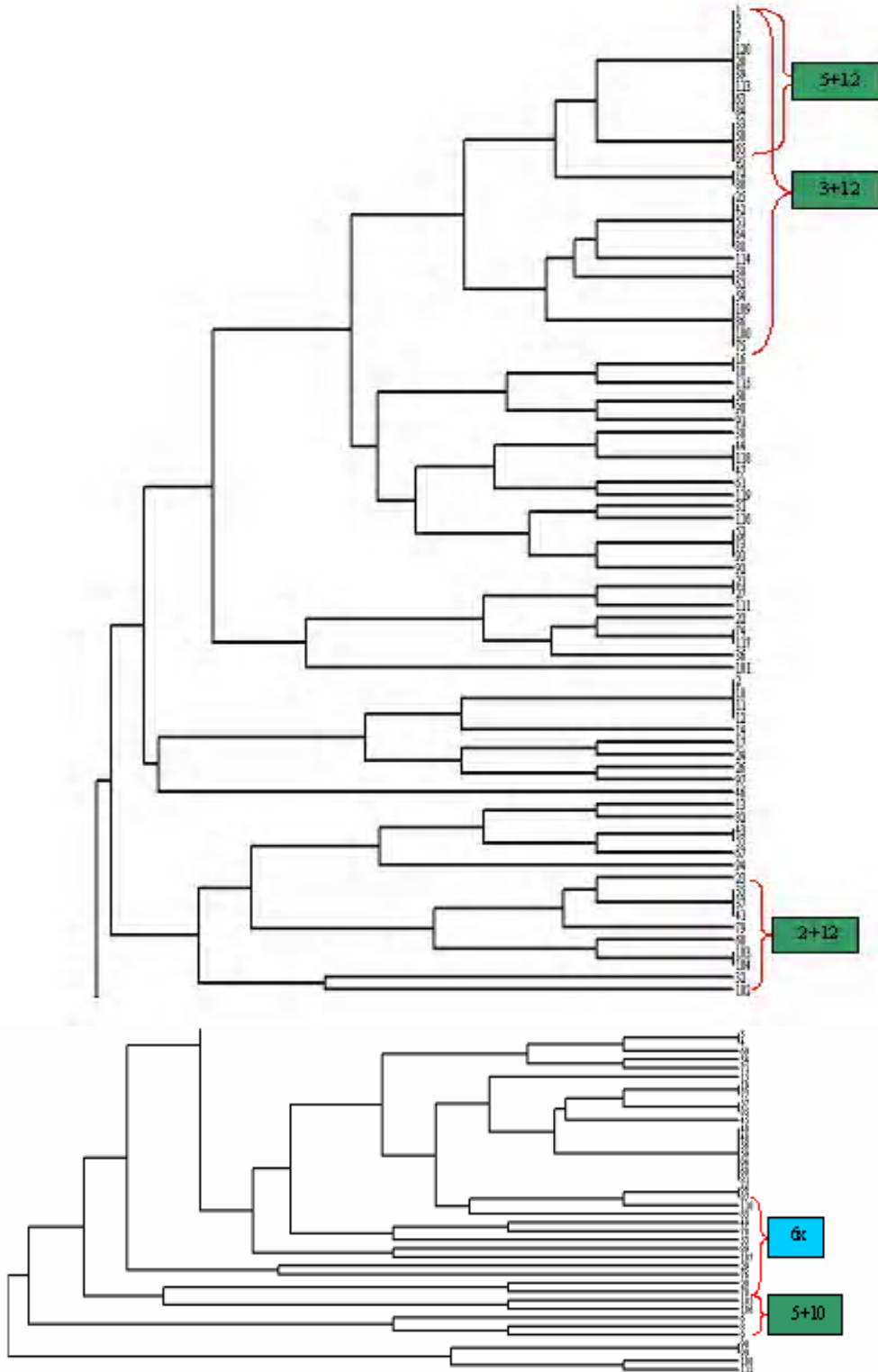
- 
- New1
  - New2
  - New3
  - New4
  - New5
  - New6
  - New7
- 

(1993) Ciaffi et al. .

(PCOA)

(1993) Lafiandra et al.

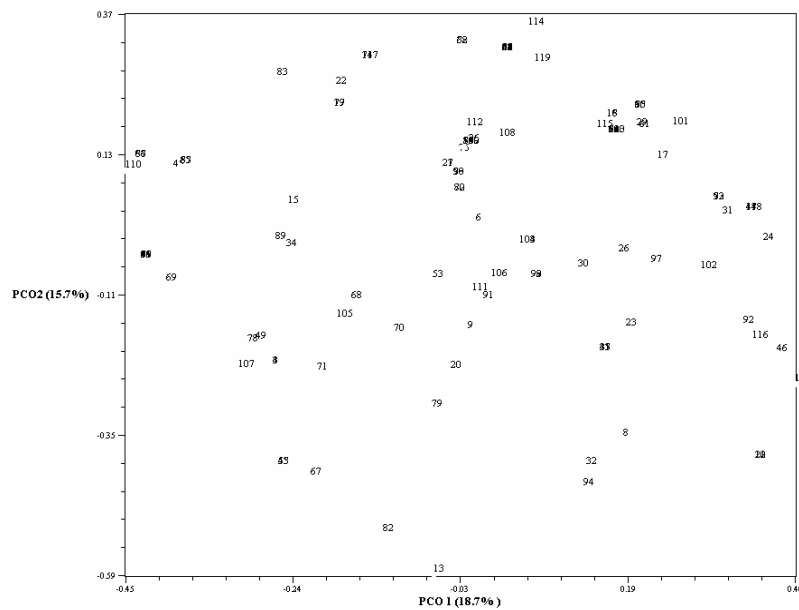
*T. urartu* *T. boeoticum*  
(1987) Nevo & Payne .



*Ae. crassa*

*Ae. crassa*

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## REFERENCES

1. Aghaei, M. J. (1995). *Evaluation of genetic diversity for quantitative traits and seed storage protein in durum wheat from Iran*. M. Sc. thesis, University of Tehran. (In Farsi).
2. Babaei, H. (1996). *Evaluation of genetic diversity in Iranian wheat landraces using seed storage protein*. M.Sc. thesis, University of Tehran. (In Farsi).
3. Bahraee, S. (2003). Bread wheat quality evaluation based on the high molecular weight Glutenin sub units, *Iranian Journal of Crop Science*, 5(3), 204-215. (In Farsi).
4. Blackman, J. A. & Payne, P. I. (1987). Grain quality. In: *Wheat Breeding*. PP. 455-485. F.G.H. Lupton ed. Chapman and Hall.
5. Ciaffi, M., Lanfiandra, D., Porceddu, E. & Benedettelli, S. (1993). Storage protein variation in wild emmer (*Triticum turgidum* ssp. *dicoccoides*) from Jordan and Turkey. 2. Patterns of allele distribution. *Theor Appl Genet*, 86, 518-5250.
6. Fulington, J. C., Cole, E. W. & Kassarda, D. D. (1983). Quantitative SDS-PAGE of total proteins from different wheat varieties: effect of protein content. *Cereal Chem*, 60, 65-71.
7. Gill, K. S., Lubbers, E. L., Gill, B. S., Raupp, W. J. & Cox, T. S. (1991). A genetic linkage map of *Triticum tauschii* (DD) and its relationship to the D genome of bread wheat (AABBDD). *Genome*, 34, 362-374.
8. Jiang, J., Friebe, B. & Gill, B. S. (1994). Recent advances in alien gene transfer in wheat. *Euphytica*, 73, 199-212.
9. Knott, D. R. & Dvorak, J. (1976). Alien germplasm as a source of resistance to disease. *Annual review of physiopathology*, 14, 211-245.
10. Laemmli, U. K. (1970). Cleavage of structural proteins during the assembly of the head of the bacteriophage T4. *Nature*, 227, 680-685.



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11. Lafiandra, D., Ciaffi, M. & Benedettelli, S. (1993). Seed storage proteins of wild wheat progenitors, In: *Biodiversity and wheat Improvement*, Damania A.B., Jhon wiley & Sons ed. ICARDA.
  12. Lagudah, E. S. & Halloran, G. M. (1988). Phylogenetic relationship of *Triticum tauschii* the D genome donor to hexaploid wheat.1. Variation in HMW subunits of glutenin and gliadins. *Theor Appl Genet*, 75, 592-598.
  13. Lagudhd, E. S. & Halloran, G. M. (1989). Phylogenetic relationship of *Triticum tauschii* the D genome donor to hexaploid wheat. 3. Variation in, and the genetics of. Seed esterase (Est-51). *Theor Appl Genet*, 77, 851-859.
  14. Mackie, A. M., Langudah, E. S., Sharp, P. J. & Lafiandra, D. (1996). Molecular and biochemical characterization of HMW glutenin subunits from *T. tauschii* and the D genome of hexaploid wheat. *J Cereal Science*, 23, 213-225.
  15. Metakovsky, E. V. & Baboev, S. K. (1992). Polymorphism and inheritance of gliadin polypeptides in *Triticum monococcum*. *Theor Appl Genet*, 84, 971-975.
  16. Mohammadi, V. & Ahmadian, P. (1998). Evaluation of genetic diversity in wild related wheat (*Triticum tauschii*) using seed storage protein. *Iranian Journal of Agricultural Science*, 30, 55-65. (In Farsi).
  17. Najafian, G. & Abdmishani, C. (1997). Effect of allelic variation for high molecular weight glutenin subunits on bread making quality of breeding lines of wheat. *Iranian Journal of Agricultural Sciences*, 28, 14. (In Farsi).
  18. Nevo, E., Golenberg, E. & Beiles, A. (1982). Genetic diversity and environmental associations of wild wheat, *Tritium dicoccoides*, in Israel. *Theor Appl Genet*, 62, 241-254.
  19. Nevo, E. & Payne, P. I. (1987). Wheat storage proteins: diversity of HMW glutenin subunits in wild emmer from Israel. *Theor Appl Genet*, 74, 827-836.
  20. Payne, P. I., Holt, L. M., Thomposn, R. D., Bartels, D., Harberd, N. P., Harris, P. A. & Law, C. N. (1983). The high molecular weight subunits of glutenin: classical genetics, molecular genetics and relationship to bread- making quality. In: *Proceedins of 6<sup>th</sup> Int. wheat Genet. Symp.* Kyoto, Japan, PP. 827-834.
  21. Payne, P. I., Law, C. N. & Mudd, E. E. (1980). Control by homoeologous group 1 chromosomes of the high-molecular- weight subunits of glutenin, a major protein of wheat endosperm. *Theor Appl Genet*, 58, 113-120.
  22. Pena, R. J., Zarco- Hernandez, J. & Mujeeb-Kazi, A. (1995). Glutenin subunit compositstions and bread-making quality characteristics of synthetic hexaploid wheats derived from *Triticum turgidum* X *Triticum tauschii* (coss) crosses. *J Cereal Science*, 21, 15-23.
  23. Ranjbar, M. (2007). *Evaluation of morphological and molecular diversity in Aegilops crossa from Iran*. M.Sc. thesis, University of Tehran. (In Farsi).
  24. Riely, R. & Kimber, G. (1966). *The transfer of alien genetic variation to wheat*. Annual report, plant breeding institute. Cambridge.
  25. Smith- Huerta, N. L., Huerta, A. J., Barnhart, D. & Waines, J. G. (1989). Genetic diversity in wild diploid wheats *Triticum monococcum* Var. *boeiticum* and *T. urartu* (Poaceae). *Theor Appl Genet*, 78, 260-264.
  26. Vojdany, P. (2003). The rule of genebank and plant genetical materials in crop products increasing. In: *Proceedings of 1<sup>st</sup> Iranian agronomy and plant breeding congress*. Karaj, Iran. (In Farsi).
  27. William, M. D. H. M. & Mujeeb-Kazi, A. (1995). *Application of biochemical markers in wheat wide crosses*. CIMMYT. Research Report 2.
  28. William, M. D. H. M., Pena, R. J. & Mujeeb- Kazi, A. (1993). Seed storage protein and isozyme variations in *Triticum tauschii* (*Aegilops squarrosa*). *Theor Appl Genet*, 87, 257-263.

