Table 1. Accessions grouped according to leaf-tip necrosis type (LTN) and their reaction to leaf rust (*Puccinia trticina*). Rating of % severity after Peterson et al. 1948).

LTN type	Rust reaction	Number	Accession name
High	Trace	20	IC536139, IC536168, EC573572, IC536220, EC573975, EC573976, EC573977, EC574115, IC536433, EC574273, EC574390, EC574426, EC574427, EC574437, EC574438, EC574444, EC574445, EC574446, EC574454, EC574627
	5	37	EC573569, IC536222, IC536431, EC574291, EC574412, EC574421, EC574428, EC574450, EC574458, EC574459, EC574460, EC574461, EC574462, EC574463, EC574475, EC574476, EC574478, EC574484, EC574485, EC574503, EC574504, EC574642,EC574690, EC574691, EC574700, EC574701, EC574702, EC574704, EC574705, EC574706, EC574707, EC574789, EC574828, EC574829, EC574830, EC574831, EC574847
	10	102	2IC536161, IC536167, IC536174, IC536176, IC536178, IC536181, IC536183, IC536187, IC536196, IC536197, IC536204, IC536216, EC573911, EC573912, EC573987, EC573988, EC573989, EC573999, IC536475, IC536503, IC536508, EC574217, EC574268, EC574271, EC574367, EC574368, EC574387, EC574397, EC574398, EC574399, EC574409, EC574410, EC574411, EC574414, EC574415, EC574422, EC574423, EC574424, EC574429, EC574447, EC574448, EC574453, EC574455, EC574456, EC574457, EC574459, EC574460, EC574464, EC574465, EC574469, EC574470, EC574471, EC574473, EC574474, EC574487, EC574488, EC574489, EC574491, EC574492, EC574495, EC574496, EC574498, EC574570, EC574594, EC574603, EC574639, EC574642, EC574690, EC574691, EC574693, EC574694, EC574712, EC574713, EC574714, EC574715, EC574716, EC574724, EC574725, EC574726, EC574727, EC574728, EC574729, EC574730, EC574735, EC574736, EC574790 , EC574817, EC574818, EC574819, EC574820, EC574821, EC574822, EC574823, EC574824, EC574825, EC574832, EC574906, EC574907, EC574908, EC574909, EC575040, EC575041
	20	15	IC536218, EC574387, EC574443, EC574468, EC574476, EC574497, EC574499, EC574501, EC574567, EC574568, EC574620, EC574826, EC574827, EC574899, EC575048
	40	2	EC573997, IC536383
	60	1	EC574569

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ITEMS FROM ITALY

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Resistance to cereal soilborne mosaic virus in durum wheat is recessive.

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The type-member of the *Furovirus* genus, soil-borne wheat mosaic virus (WSBMV), was first identified in the U.S. about 80 years ago and, thereafter, reported in most of the wheat-growing areas of the world including Italy. In 2005, following the results of sequence and alignment analyses, the soilborne mosaic virus isolates prevalent in North America, Europe, and far-eastern Asia were subdivided into three distinct species within the *Furovirus* genus denominated by, respectively, soil-borne wheat mosaic virus, soil-borne cereal mosaic virus (CSBMV), and Chinese wheat mosaic virus (CWMV).

According to various reports, resistance to WSBMV and CWMV in common (hexaploid) wheat is governed by 1–3 major genes, whereas CSBMV resistance in durum (tetraploid) wheat is controlled by major genes as well by a plethora of genes with small effects. Indeed, as many as nine minor genes contributed by both parents have been detected in RILs from a single durum wheat cross. In hexaploid wheat, resistance to WSBMV and to CWMV generally is believed to be inherited as a dominant trait, and this view has been implicitly extended to CSBMV-resistance in durum wheat. Quite unexpectedly, observations by the senior author on F_1 durum wheat plants grown outdoors near Rome for

general breeding purposes suggested that at least some durum wheat cultivars carry either recessive or co-dominant CSBMV-resistance genes. In fact, F_1 plants derived from crosses between CSBMV-resistant and CSBMV-susceptible durum wheat cultivars often showed severe CSBMV symptoms even under mild disease pressure.

A six-parent, diallel cross without reciprocals was set up to verify this hypothesis. The parents included cultivars Ionio (resistant = R), Neodur (R), Duilio (moderately resistant = MR), Cirillo (susceptible = S), Valnova (S), and Simeto (moderately susceptible = MS). Cultivars Neodur and Ionio, both derived from the cultivar Edmore, are known to carry a major CSBMV-resistance gene or gene-block located on the short arm of chromosome 2B. Duilio also is known to carry one or more major CSBMV-resistance factors on 2BS, possibly the same as Neodur and Ionio (Maccaferri et al. 2011; Russo et al. in press). Based on their response in previous trials and on the results of recent genetic and molecular marker studies, all the cultivars intercrossed, including the susceptible ones, presumably carry minor resistance genes. The six parental cultivars were grown during 2008–09 in a field free of CSBMV near Foggia and intercrossed in all combinations excluding reciprocals. In the the following season, the resulting 15 F_1s were seeded on 29 October, along with their parents, in a naturally CSBMV-infected field near Bologna in plots consisting of single 1.5-m rows. Twenty seeds were sown in each row. Plots were distributed according to a randomized-block design with three replicates. Symptom-severity was rated on 7 April on a whole-plot basis using a 0–4 scale. DAS ELISA was performed on extracts from a bulk of the basal portions of the two youngest fully expanded leaves collected on 9 April from 10 plants/plot.

CSBMV-pressure was severe, as testified by the high mean symptom scores recorded for the susceptible parents (Table 1). Symptom scores and ELISA values were significantly correlated (r = 0.887; P 0.001). The nine F_1s derived from crosses between resistant and susceptible parents manifested a clearly susceptible reaction in terms of symptom severity (range = 2.5–3.4), in all cases significantly higher than that recorded for any of the three resistant parents (range = 0.6–1.0). Moreover, ELISA values for the 'R/S' F_1s (ELISA range = 0.70 – 1.12) were much closer to those recorded for the susceptible parents (ELISA range = 1.06–1.15) than for the resistant ones (range = 0.03–0.47). The noticeable difference (2.2) between the mean symptom score recorded for the 'R/S' F_1s and for the three resistant parents closely corresponds to the effect estimated for the major CSBMV-resistance QTL identified in recent studies on RILs derived from the durum wheat crosses 'Meridiano / Claudio' and 'Neodur / Cirillo'.

Table 1. Mean CSBMV symptom score (on a 0–4 scale) and mean DAS-ELISA value for the parents and F_1 hybrids of a six-parent diallel cross without reciprocals between durum wheat cultivars.

Genotype	Mean symptom score (April 7)	Mean DAS-ELISA value (April 9)
Resistant parents (3)	0.8	0.18
Resistant/Resistant F_1s (3)	0.5	0.34
Resistant/Susceptible F_1s (9)	3.0	0.87
Susceptible/Susceptible F_1s (3)	3.6	1.01
Susceptible parents (3)	3.7	1.09

The 'R/S' F_1s showed a somewhat greater degree of CSBMV-resistance than the susceptible parents both in terms of symptom severity and ELISA value, suggesting that the minor genes for CSBMV-resistance contributed by the parental cultivars were prevalently dominant. This hypothesis, however, was not validated by the response of single 'R/S' F_1s, which was quite erratic, nor by that of the 'R/S' F_1s, which was pratically identical to that of their susceptible parents.

Based on the above results, we concluded that the durum wheat cultivars Ionio, Neodur, and Duilio carry a recessive (or incompletely recessive) major CSBMV-resistance gene or gene-block, and that the six parental cultivars carry dominant, as well as recessive, modifiers that interact in disparate ways to induce small and, as yet unpredictable, modifications in the final expression of resistance in F_1 plants.

Given the close affinity between durum (genome AABB) and common wheat (genome AABBDD) as well as between WSBMV, CSBMV, and CWMV, our results on CSBMV-resistance in durum wheat are difficult to reconcile with the dominance generally reported for WSBMV and CWMV in hexaploid wheat. In this respect, it should be noted that some of the papers thus far published on the genetics of WSBMV and CWMV resistance contain obvious contradictions, and that they are all quite vague in relation to both the phenotyping criteria adopted and to the disease pressure encountered. We are presently conducting further experiments on the inheritance of CSBMV resistance using a different set of durum and common wheat cultivars of various origins.

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Response of 32 durum wheat cultivars to cereal soilborne mosaic virus in 2009.

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Cereal soil-borne mosaic virus in Italy was first detected in the Po Valley in 1960 and now is known to be widespread throughout most of the country, particularly in the northern and central regions. Thirty-two durum wheat cultivars were grown during 2008–09 in a field with CSBMV at Cadriano, near Bologna, and evaluated for resistance on the basis of symptom severity, DAS-ELISA value and agronomic performance. The cultivars, planted on 20 November, 2008, were grown in 10-m^2 solid-seeded plots distributed in the field according to a randomized block design with three replicates. Symptom severity was evaluated on three dates (1, 9, and 14 April) using a 0–4 scale. DAS-ELISA was performed on extracts from a bulk of the basal half of the second and third youngest leaves of 10 randomly chosen plants/plot collected on 6 April, 2009.

Cereal soil-borne mosaic virus pressure during the 2008–09 season was relatively low, as testified by the mild symptom scores recorded for cultivars known for their susceptibility. The data collected, in any case, indicated that some of the cultivars assayed for the first time, particularly Canova, Karur, Liberdur, Trionfo, and Tripudio, are susceptible to CSBMV (Table 2, continued on p. 91).

Table 2. Response to cereal soil-borne mosaic virus of 32 durum wheat cultivars grown near Bologna, Italy, in 2008–09. Items with the same letter(s) are statistically similar.

Cultivar	Symptom severity score (0–4 scale)				ELISA value	Grain yield (t/ha)	Plant height (cm)	Days-to-heading (from 1 April)	Kernel weight (g)	Test weight (kg/hL)
	1 April	9 April	14 April	Mean	6 April					
Achille	2.1 ad	2.8 ab	2.7 ab	2.53	0.795 bf	5.04 bh	80.0 bf	42 bd	38.4 jk	78.6 a
Alemanno	1.1 cg	0.6 fg	0.5 eh	0.74	0.008 f	5.79 af	89.0 a	39 hj	50.4 a	75.9 ch
Anco Marzio	2.5 ab	2.7 ac	2.7 ab	2.61	0.626 cf	5.18 bg	82.7 ad	40 ef	39.2 jk	77.5 ac
Arnacoris	0.6 eg	0.1 g	0.1 gh	0.28	0.017 f	6.16 ae	81.3 be	39 hj	43.4 ei	74.7 fj
Artemide	0.9 dg	1.4 bg	1.4 bh	1.25	0.399 ef	5.27 bg	74.3 ei	40 fh	44.6 dg	74.5 gj
Biensur	0.2 g	0.1 g	0.1 gh	0.13	0.009 f	5.77 af	74.7 ei	42 bc	38.5 jk	75.0 ej
Casanova	2.3 ad	2.7 ac	2.4 ac	2.44	0.855 af	4.91 ch	77.3 ch	38 ik	50.3 a	74.7 fj
Ciccio	2.2 ad	2.5 ad	2.7 ab	2.44	1.460 ae	3.61 h	69.0 i	38 il	38.8 jk	75.5 di
Ciclope	2.4 ac	2.2 af	2.5 ac	2.34	0.953 af	4.09 gh	76.7 dh	39 gi	42.8 fi	69.8 m
Claudio	1.9 ae	2.0 af	2.3 ac	2.06	0.872 af	4.72 dh	85.7 ab	40 eg	43.5 eh	78.8 a
Creso	1.5 bg	1.1 cg	1.5 bh	1.36	0.783 bf	5.58 ag	75.3 ei	42 b	45.9 bf	77.0 ad
Duilio	0.6 eg	0.8 eg	0.1 gh	0.47	0.279 f	5.40 ag	81.0 be	38 jl	48.2 ac	76.4 bf
Dylan	0.2 g	0.1 g	0.0 h	0.09	0.043 f	6.91 a	84.0 ac	41 ce	44.4 dg	74.6 fj
Imothep	1.8 ae	1.4 bg	1.4 bh	1.56	0.008 f	6.01 ae	83.0 ad	37 l	45.3 bg	77.9 ab
Iride	1.2 bg	1.2 bg	1.1 ch	1.14	0.313 ef	6.51 ab	77.3 ch	38 il	42.1 gj	75.1 ej
Isildur	0.7 eg	0.8 dg	1.2 bh	0.89	0.273 f	5.29 bg	79.0 bg	38 jl	46.3 bf	76.7 be
Karur	2.2 ad	2.3 ae	2.1 ad	2.19	1.980 a	5.27 bg	78.3 ch	45 a	40.1 hk	72.7 kl
Latinur	0.9 dg	0.8 dg	0.7 dh	0.81	0.882 af	5.89 af	72.7 gi	41 df	43.6 eh	75.5 di
Levante	1.3 bg	1.1 cg	1.3 bh	1.24	0.305 ef	6.31 ac	80.7 be	41 ce	44.5 dg	76.2 bg
Liberdur	2.9 a	3.3 a	3.3 a	3.19	1.871 ab	4.35 fh	73.3 fi	44 a	39.1 jk	72.3 l
Minosse	1.8 ae	2.3 af	2.4 ac	2.17	0.507 df	4.94 ch	79.0 bg	38 ik	44.2 eg	78.0 ab
Neolatino	1.8 ae	1.1 cg	1.5 bh	1.47	0.632 cf	4.89 ch	78.3 ch	38 il	48.3 ac	76.3 bg

Table 2. Response to cereal soil-borne mosaic virus of 32 durum wheat cultivars grown near Bologna, Italy, in 2008–09. Items with the same letter(s) are statistically similar.

Normanno	0.4 fg	0.7 eg	0.3 fh	0.46	0.457 ef	6.27 ad	78.0 ch	40 fh	46.8 be	75.2 ej
Orobel	2.3 ad	2.7 ac	1.8 ae	2.25	1.712 ac	4.41 fh	77.3 ch	45 a	44.8 cg	73.4 jl
Pr22d89	0.9 dg	0.7 eg	1.3 bh	0.94	0.314 ef	4.97 bh	78.0 ch	37 kl	48.6 ab	77.1 ad
Principe	1.5 bg	1.7 bg	1.6 bg	1.58	1.709 ac	4.95 ch	82.7 ad	38 jl	47.9 ad	73.9 il
Saragolla	1.2 bg	1.0 cg	0.7 dh	0.96	0.017 f	5.52 ag	74.7 ei	38 jl	40.4 hj	75.7 ci
Severo	1.4 bg	1.2 bg	1.7 bf	1.42	0.395 ef	5.78 af	84.0 ac	40 eg	36.7 k	75.0 ej
Simeto	2.2 ad	2.1 af	2.3 ac	2.17	1.899 ab	4.82 ch	71.7 hi	39 gi	48.3 ac	73.5 jl
Tirex	0.7 eg	0.2 g	0.4 eh	0.42	0.017 f	5.86 af	80.7 be	38 ik	42.7 fi	77.9 ab
Trionfo	1.8 af	2.1 af	2.3 ac	2.06	1.718 ac	4.69 eh	78.0 ch	42 b	39.9 ik	74.3 hk
Tripudio	1.8 af	2.1 af	2.7 ab	2.17	1.657 ad	5.02 bh	77.0 ch	41 df	40.3 hj	75.9 ch
Mean	1.47	1.49	1.53	1.49	0.743	5.32	78.6	39.8	43.7	75.5
Minimum	0.17	0.05	0.00	0.09	0.008	3.61	69.0	37.0	36.7	69.8
Maximum	2.92	3.33	3.33	3.19	1.980	6.91	89.0	44.7	50.4	78.8

Mean symptom severity score was significantly correlated with ELISA value and grain yield, but not with the other plant characters measured (Table 3). Regression analysis indicated that the 12 cultivars showing symptom scores between 2.0 and 3.0 suffered a 25% mean grain yield loss.

Table 3. Simple correlation coefficients between mean symptom severity, mean ELISA value, and various agronomic characters for 32 durum wheat cultivars grown in a field with cereal soil-borne mosaic virus near Bologna, Italy, during 2008–09. Items with ** are significantly correlated; all others are nonsignificant.

	ELISA value	Grain yield	Plant height	Heading date	Kernel weight	Test weight
Symptom severity	0.729**	–0.751**	–0.248	0.314	–0.276	–0.188
ELISA value	—	–0.663**	–0.407**	0.500**	–0.160	–0.473**

Response of 33 durum wheat cultivars to cereal soilborne mosaic virus in 2010.

C. Rubies-Autonell and C. Ratti, (DiSTA, Bologna), A. Sarti (ASTRA, Faenza), R. Canestrale (CRPV, Imola), and V. Vallega (CRA–QCE, Rome).

Thirty-three durum wheat cultivars were grown during 2009–10 in a field with CSBMV at Cadriano, near Bologna, and evaluated for resistance on the basis of symptom severity, DAS-ELISA value, and agronomic performance. The cultivars, planted 30 October, 2009, were grown in 10-m^2 solid-seeded plots distributed in the field according to a randomized block design with three replicates. Symptom severity was evaluated on three dates (17 and 25 March and 7 April) using a 0–4 scale. DAS-ELISA was performed on extracts from a bulk of the basal half of the second and third youngest leaves of 10 randomly chosen plants/plot collected on 26 March and 9 April, 2010.

The cultivars Dylan and Biensur showed very mild symptoms and relatively low ELISA values; both produced high grain yields, superseeded only by those recorded for the moderately resistant cultivar Levante (Table 4, p. 92). Relatively low symptom scores and ELISA values, as well as relatively high grain yields, were recorded also for cultivars Duilio, Saragolla, Alemanno, Pharaon, Meridiano, and Svevo.

Mean ELISA value and mean symptom severity score were significantly correlated (0.736**), and both resistance parameters were significantly correlated with all the agronomic traits considered except test weight (Table 5, p. 92). Regression analysis indicated that cultivars showing symptom scores between 3.0 and 3.8 (Table 6, p. 93) suffered a 53% mean grain yield loss, as well as severe reductions in plant height (31%) and kernel weight (16%).

Table 4. Response to cereal soil-borne mosaic virus of 33 durum wheat cultivars grown near Bologna, Italy, in 2009–10. Items with the same letter(s) are statistically similar. Symptom severity was rated on a 0–4 scale and are the mean of three dates.

Cultivar	Symptom severity score			ELISA value	Grain yield (t/ha)	Plant height (cm)	Days-to-heading (from April 1)	Kernel weight (g)	Test weight (kg/hl)
	26 March	9 April	Mean						
Achille	3.78	0.981 ad	1.160 a	1.071	2.77 ik	60.0 jl	44 ab	36.0 pq	75.5 ag
Alemanno	1.36	0.915 ae	0.310 il	0.613	4.31 bh	85.0 a	37 hl	52.1 a	73.3 di
Anco Marzio	3.44	1.085 ad	1.066 ab	1.076	2.44 jk	61.7 hl	41 cd	39.4 mp	72.4 hi
Arnacoris	2.82	0.751 af	0.358 il	0.555	3.53 ej	75.7 be	39 ei	43.9 ek	72.3 hi
Aureo	3.16	0.611 cf	0.559 ek	0.585	2.58 jk	82.0 ab	40 dg	40.3 jo	73.0 fi
Biensur	0.69	0.723 af	0.384 hl	0.554	5.36 ab	79.0 ac	41 cd	40.0 lo	74.7 bh
Cannavaro	3.35	1.127 ab	1.156 a	1.142	3.28 gk	68.3 fh	44 ab	48.0 bd	72.0 hi
Ciccio	3.17	1.099 ac	1.095 a	1.097	2.28 k	65.0 gk	36 jl	38.0 oq	73.7 ch
Claudio	3.61	1.062 ad	0.912 af	0.987	0.87 l	49.7 m	45 ab	41.8 ho	73.0 fi
Creso	3.44	1.023 ad	0.957 ae	0.990	2.42 jk	58.3 kl	44 ab	45.4 bh	76.7 ab
Duilio	1.04	0.638 bf	0.259 il	0.449	4.92 bd	82.7 ab	35 km	48.4 bc	74.7 bh
Dylan	0.89	0.605 cf	0.195 jl	0.400	5.19 ac	81.7 ab	40 cf	44.7 ci	73.8 ch
Grazia	3.32	1.128 ab	1.130 a	1.129	2.41 jk	66.3 gj	41 ce	35.2 q	72.9 fi
Ignazio	2.87	0.641 bf	0.623 ci	0.632	4.15 bh	78.7 ad	40 dg	49.1 ab	76.8 ab
Imhotep	3.14	0.961 ad	0.548 ek	0.755	3.96 di	76.3 be	35 lm	45.6 bh	77.6 a
Iride	2.33	0.581 df	0.391 gl	0.486	4.39 bh	74.3 cf	35 km	42.4 gn	78.0 a
Karur	3.12	1.173 a	1.096 a	1.135	3.92 di	60.3 il	46 a	41.4 io	73.5 dh
Latinur	2.12	1.028 ad	0.806 ag	0.917	3.28 gk	65.0 gk	38 fj	41.4 io	70.6 i
Levante	1.31	0.395 f	0.001 l	0.198	6.24 a	82.0 ab	39 dh	44.9 ci	73.9 ch
Liberdur	3.62	1.144 ab	1.047 ab	1.096	3.53 ej	57.0 l	44 ab	40.1 ko	76.3 ac
Meridiano	1.89	0.873 af	0.447 gk	0.660	4.57 bf	83.0 ab	35 km	47.5 bf	76.0 ad
Minosse	2.70	0.983 ae	0.784 ah	0.884	2.52 jk	67.3 fi	36 il	42.9 gm	73.2 ei
Neolatino	2.17	0.839 af	0.667 bi	0.753	3.19 hk	79.3 ac	35 lm	47.7 be	75.8 ae
Normanno	2.73	0.958 ae	0.532 fk	0.745	3.43 fk	71.7 dg	39 ei	43.9 ej	73.2 ei
Pharaon	1.53	0.454 ef	0.179 kl	0.317	4.52 bg	78.3 ad	37 il	45.2 ci	73.8 ch
Pr22d89	2.61	1.110 ac	0.969 ad	1.040	4.10 ch	70.3 eg	37 gk	44.7 ci	76.4 ac
Saragolla	1.22	0.909 ae	0.601 dj	0.755	4.71 be	75.7 be	35 km	44.1 di	72.7 gi
Severo	3.67	0.704 af	1.060 ab	0.882	3.56 ej	58.7 kl	42 bc	38.9 np	78.0 a
Simeto	2.56	1.186 a	1.018 ac	1.102	3.59 ej	68.0 fh	38 fj	45.9 bg	73.2 di
Svevo	1.94	0.751 af	0.431 gk	0.591	4.38 bh	84.7 a	33 m	44.1 di	75.7 af
Tirex	2.36	1.037 ad	0.504 fk	0.771	4.53 bg	79.7 ac	35 lm	46.2 bg	76.8 ab
Trionfo	3.12	1.110 ac	1.093 a	1.102	3.56 ej	66.0 gj	41 cd	40.0 lo	75.7 af
Tripudio	2.93	1.139 ab	1.086 a	1.113	3.65 ej	68.3 fh	41 cd	43.8 fl	77.0 ab
Mean	2.54	0.901	0.710	0.806	3.70	71.5	39	43.4	74.6
Minimum	0.69	0.395	0.001	0.198	0.87	49.7	33	35.2	70.6

Table 5. Simple correlation coefficients between mean symptom severity, mean ELISA value, and various agronomic characters for 33 durum wheat cultivars grown in a field with cereal soil-borne mosaic virus near Bologna, Italy, during 2009–10. Items with ** are significantly correlated; all others are nonsignificant.

	ELISA value	Grain yield	Plant height	Heading date	Kernel weight	Test weight
Symptom severity	0.736**	–0.779**	–0.757**	0.535**	–0.470**	–0.139
ELISA value	—	–0.669**	–0.777**	0.491**	–0.420*	–0.047

Table 6. Estimated mean effects of cereal soil-borne mosaic virus on 33 durum wheat cultivars with different disease severity grown in a field near Bologna, Italy, during 2009–10.

Disease score	Number of cultivars	Grain yield loss		Plant height reduction		Kernel weight reduction		Heading delay
		t/ha	%	cm	%	g	%	
0.00–1.00	2	0.82	13	11.6	13	6.2	13	7
1.01–2.00	7	1.29	21	10.3	11	1.9	4	2
2.01–3.00	11	2.43	40	19.4	21	3.8	8	4
3.01–3.80	13	3.20	53	28.1	31	7.8	16	8

Response of 31 durum wheat cultivars to cereal soilborne mosaic virus in 2011.

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Thirty-one durum wheat cultivars were grown during 2010–11 in a field with CSBMV at Cadriano, near Bologna, and evaluated for resistance to this pathogen on the basis of symptom severity and DAS-ELISA readings. Seven of the cultivars (Dorato, Ismur, Kanakis, Ramirez, Sculptur, Torrese, and Yelowdur) had not been assayed for CSBMV-resistance before. The cultivars were planted 9 November, 2010, in 10-m^2 solid-seeded plots distributed in the field according to a randomized block design with three replicates. DAS-ELISA was performed on extracts from a bulk of the basal half of the first fully developed leaf of 10 randomly chosen plants/plot collected on 24 April, 2011. Because plant stunting was neglible and foliar mosaic symptoms became severe only towards the end of March, symptom severity was rated late in the season (4 and 24 April) and solely on the basis of foliar mosaic. Due to fund scarcity, grain yield and other agronomic characters were not measured.

ELISA value and mean symptom severity score were closely correlated (0.569**) but far less than in seasons characterized by an early appearance of severe visible CSBM-symptoms. As a matter of fact, some cultivars, particularly Anco Marzio, Creso, and Imhotep, exhibited a resistant response to CSBMV in terms of ELISA value yet a susceptible or moderately susceptible reaction in terms of visible symptoms (Table 7). These three cultivars were classified as susceptible or moderately susceptible in previous trials. Cultivars Sculptur and Yelodur, assayed for the first time, also showed discrepancy in response to severity of visible symptoms and ELISA value. Among the other cultivars tested for the first

Table 7. Response to cereal soil-borne mosaic virus of 31 durum wheat cultivars grown near Bologna, Italy, in 2010–11. Symptom severity was rated on a 0–4 scale. Values with the same letter(s) are statistically similar.

Cultivar	Symptom severity score			ELISA value
	4 April	24 April	Mean	24 April
Achille	2.33 ag	2.33 ag	2.34 af	0.619 be
Anco Marzio	3.08 ac	2.17 ai	2.63 ae	0.007 e
Arnacoris	1.58 ei	2.17 ai	1.88 dg	0.168 de
Biensur	0.33 j	0.00 k	0.17 i	0.032 e
Ciccio	2.17 bh	2.92 ac	2.54 ae	1.126 ad
Claudio	2.58 ae	1.92 bj	2.25 af	0.667 be
Creso	2.83 ad	2.33 ag	2.59 ae	0.263 ce
Dorato	3.33 ab	2.83 ad	3.08 ab	0.528 be
Duilio	1.75 dh	2.49 af	2.12 bf	0.014 e
Dylan	2.00 ch	2.25 ah	2.13 bf	0.002 e
Grazia	3.00 ac	3.08 a	3.04 ac	1.375 ab
Imhotep	2.83 ad	2.67 ae	2.75 ad	0.007 e
Iride	1.75 dh	1.50 fj	1.63 eh	0.070 e
Ismur	3.42 a	3.00 ab	3.21 a	1.747 a
Kanakis	1.25 gj	1.50 fj	1.38 fh	0.006 e
Karur	2.17 bh	1.92 bj	2.05 cf	0.929 ae
Latinur	2.50 af	2.42 ag	2.46 ae	0.601 be
Levante	2.58 ae	1.67 ej	2.13 bf	0.001 e
Liberdur	3.08 ac	3.08 a	3.09 ab	1.702 a
Meridiano	1.08 hj	1.00 j	1.04 gh	0.064 e
Neolatino	1.33 fj	1.92 bj	1.63 eh	0.075 e
Normanno	1.67 di	1.08 ij	1.38 fh	0.604 be
Pharaon	2.17 bh	1.67 ej	1.92 dg	0.003 e
Ramirez	0.58 ij	1.17 hj	0.88 hi	0.002 e
Saragolla	2.08 ch	1.83 cj	1.96 dg	0.047 e
Sculptur	2.42 ag	1.75 dj	2.09 bf	1.183 ac
Simeto	3.00 ac	2.08 aj	2.55 ae	0.877 ae
Svevo	2.00 ch	2.08 aj	2.04 cf	0.008 e
Tirex	2.00 ch	1.75 dj	1.88 dg	0.009 e
Torrese	2.08 ch	1.33 gj	1.71 eh	0.008 e
Yelodur	2.58 ae	2.00 aj	2.29 af	0.001 e
Mean	2.18	2.00	2.09	0.411
Minimum	0.33	0.00	0.17	0.001
Maximum	3.42	3.08	3.21	1.747

time, Kanakis, Ramirez, and Torrese showed high levels of CSBMV resistance, whereas Ismur and Dorato were susceptible.

All cultivars classified as resistant or moderately resistant in previous trials exhibited comparable reactions in 2011, and consistent responses also were observed for all those previously classified as susceptible or moderately susceptible except for Anco Marzio, Creso, and Imhotep, which expressed a susceptible reaction only in terms of symptom expression.

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CEREAL QUALITY RESEARCH UNIT (CRA) OF THE ITALIAN RESEARCH COUNCIL
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Comparison between bread wheat and barley in the inner hillside of south-central Italy.

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In 2009 and 2010, field experiments were carried out in Colletorto, a location in the Molise region (41°40' N), an inner hill environment (515 masl) surrounded by the Central Apennine Mountain Range. In this location, 14 bread wheat cultivars and 19 barley cultivars for livestock feeding are tested yearly. Trials are in a randomized complete block design with three replications. Bread wheat cultivars are catalogued according with the Synthetic Quality Index method (Indice Sintetico di Qualità, ISQ), from the strongest type, FF (frumento di forza, improver wheat), particularly used for manufacturing products with a strong and well-leavened structure, to the weakest type, FAU (frumento per altri usi, wheat for other purposes). The intermediate wheat categories, FPS (frumento panificabile superiore, superior bread making wheat) and FP (frumento panificabile, ordinary bread making wheat), present properties suitable for ordinary bread making. The average yields for the period were similar for both crops (4.15 t/ha for bread wheat and 4.19 t/ha for barley (Table 1, p. 95)). An overall yield reduction in 2009, compared to 2010, was observed for both barley and bread wheat. Five bread wheat genotypes (Epidoc, Exotic, Blasco, Genesi, and Adelaide) reached a yield greater than 4.5 t/ha with yield indices higher than 100 in every year. Among these cultivars, Blasco and Adelaide showed a very interesting test weight average (84.8 kg/hL and 82.1 kg/hL, respectively), a character very important for milling industry.

Seven barley cultivars (Estival, Oleron, Shangrila, Mattina, Campagne, Calanque, and Aldebaran) exceeded a yield of 4.5 t/ha, with yield indicies higher than 100 in each year. Among these, only Calanque exceeded a 70 kg/hL average test weight value.

Table 1. ISQ class, growth cycle, grain yield, and test weight of 14 Italian bread wheat cultivars and 19 Italian barley cultivars tested during a 2-year period (2010–11) in the Molise region of Italy.

Cultivar	ISQ class	Heading date (days after 1 April)	Yield			Test weight		
			Index		Mean (t/ha)	Index		Mean (kb/hL)
			2009	2010		2009	2010	
Bread wheat								
Bologna	FF	48	63	96	3.45	102	101	81.4
Valbona	FF	39	99	91	3.90	103	100	81.7
Adelaide	FPS	44	124	101	4.58	103	101	82.1
Blasco	FPS	47	120	110	4.73	105	105	84.8
Antille	FP	53	102	88	3.89	99	98	79.5
Aubusson	FP	51	94	95	3.94	100	99	79.8
Colledoro	FP	52	100	90	3.92	101	101	81.5
Epidoc	FP	51	125	118	5.02	99	98	79.1
Exotic	FP	50	127	107	4.78	97	98	78.4
Genesi	FP	50	117	106	4.60	100	101	80.9
Lilliput	FP	48	111	88	4.04	101	101	81.4
Mieti	FP	46	66	70	2.83	99	99	80.0
PR22R58	FP	51	105	91	4.02	100	100	80.4
Sollario	FAU	51	97	99	4.08	103	99	81.1
Mean		**48**	**3.37**	**4.94**	**4.15**	**79.0**	**82.1**	**80.5**
Barley								
Cultivar	**Height (cm)**	**Heading date (days after 1 April)**	**Yield**			**Test weight**		
			Index		**Mean (t/ha)**	**Index**		**Mean (kb/hL)**
			2009	**2010**		**2009**	**2010**	
Aldebaran	77	40	108	108	4.51	92	94	63.7
Amillis	82	38	73	79	3.24	99	103	69.1
Calanque	79	40	105	110	4.54	103	104	70.8
Campagne	82	40	124	101	4.57	100	98	67.4
Cometa	78	42	105	95	4.12	99	103	69.1
Estival	76	37	111	124	5.02	98	99	67.4
Explora	78	37	115	89	4.11	98	96	66.6
Ketos	79	40	96	97	4.06	99	101	68.4
Laverda	84	42	72	104	3.88	95	96	65.3
Lutece	80	38	97	100	4.15	98	97	66.6
Marjorie	84	38	98	105	4.30	107	104	72.0
Mattina	80	42	110	114	4.72	99	101	68.5
Meseta	75	38	115	80	3.87	104	105	71.8
Nure	80	38	95	86	3.74	102	103	70.2
Oleron	78	38	114	117	4.84	95	92	64.0
Rodorz	90	43	102	100	4.21	103	100	69.2
Sfera	80	40	87	103	4.07	104	105	71.5
Shangrila	80	39	123	109	4.78	101	98	67.9
Siberia	76	38	80	103	3.97	96	95	65.5
Mean	**80**	**40**	**2.98**	**5.39**	**4.19**	**67.9**	**68.9**	**68.4**

Conventional bread wheat: results of the 2010 – 2011 varietal evaluation in Latium region (Central Italy).

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The Research Unit for Cereal Quality of the Italian Agricultural Research Council (CRA–QCE, Rome) performs a varietal evaluation of bread wheat cultivars in different experimental fields in Central Italy. In the 2-year period between 2010 and 2011, field experiments were carried out in Latium region (Central Italy), in four locations (Montelibretti, Rieti, Rome and Tarquinia) . In every study site, trials were performed according with a RCBD with 3 replicates.

The tested cultivars are catalogued according with the Synthetic Quality Index method (Indice Sintetico di Qualità, ISQ), from the strongest type FF (frumento di forza, improver wheat), particularly used for manufacturing products with a strong and well leavened structure, to the weakest type FB (frumento da biscotto, wheat for biscuits), more appropriate to lend friableness to the products. The intermediate wheat categories, FPS (frumento panificabile superiore, superior bread making wheat) and FP (frumento panificabile, ordinary bread making wheat), present properties suitable for ordinary bread making.

The agronomic performance of the 17 bread wheat genotypes is summarized (Table 2). The overall average yield during the two-year period reached 6.20 t/ha. Eight cultivars reached yields exceeding 6.30 t/ha, with yield indexes not lower than 100 in every year. Among these, Masaccio, Altamira, Arabia, Tiepolo, and Anforeta, also showed test weights higher than 80 kg/hL. Blasco (class FPS) was characterized by the highest test weight (83.6 kg/hL); on the contrary, its productive performance (6.00 t/ha) resulted slightly below the average grain yield.

Table 2. ISQ class, grain yield, and test weight of 17 Italian bread wheat cultivars tested during a 2-year period (2010–11) at four locations in the Latium Region of central Italy.

		Yield			Test weight		
		Index		Mean	Index		Mean
Cultivar	ISQ class	2010	2011	t/ha	2010	2011	kg/hL
Bologna	FF	95	87	5.61	103	100	80.7
Apoteosi	FPS	84	94	5.51	102	102	81.1
Arrocco	FPS	95	99	6.01	100	100	79.7
Blasco	FPS	96	98	6.00	106	105	83.6
Tiepolo	FPS	106	102	6.46	101	100	80.0
Altamira	FP	111	103	6.64	100	102	80.1
Andana	FP	87	93	5.58	102	101	80.5
Anforeta	FP	100	104	6.36	102	103	81.4
Aubusson	FP	95	97	5.97	97	96	76.8
Bandera	FP	113	100	6.60	100	100	79.4
Masaccio	FP	112	105	6.74	101	101	80.0
Mieti	FP	91	84	5.40	99	99	78.5
PR22R58	FP	113	102	6.63	100	100	79.1
Sirtaki	FP	106	107	6.61	97	96	76.6
Solehio	FP	99	116	6.70	100	98	78.4
Arabia	FB	106	103	6.47	102	101	80.5
Artico	FB	101	95	6.08	95	96	75.5
Location		**Mean (t/ha)**			**Mean (kg/hL)**		
		5.85	**6.54**	**6.20**	**77.4**	**81.2**	**79.3**
Montelibretti		6.08	7.99	7.03	78.2	83.5	80.8
Roma		4.91	6.67	5.79	74.3	80.5	77.4
Rieti		6.40	4.94	5.67	76.3	79.2	77.8
Tarquinia		6.03	6.57	6.30	80.9	81.6	81.2

Conventional durum wheat: results of the 2009–11 Italian National Network Trials.

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The Research Unit for Cereal Quality of the Italian Agricultural Research Council (CRA-QCE, Rome) coördinates national network trials for the evaluation of the overall performance of durum wheat cultivars in conventional farming. From 2009 to 2011, field experiments were performed at 50 locations, grouped into six main geographical and pedoclimatic areas (Sicily, southern Italy, Sardinia, Thyrrenic–central Italy, Adriatic–central Italy, and northern Italy). Several cultivars were evaluated; some were tested in all the environments, whereas others were considered suitable only for a part. Trials were in a randomized complete block design with three replications.

A synthesis is shown of the agronomic performance of the 13 genotypes evaluated in all the areas for the entire period between 2009 and 2011 (Table 3. pp. 97-98). Such cultivars represents a considerable amount of the durum wheat seed commercialized in Italy. The average national yield for the period reached 4.83 t/ha; the highest production was achieved in Adriatic–central Italy (6.13 t/ha) and the lowest in Sicily (3.87 t/ha). Three of the cultivars, Claudio, Tirex, and Normanno, reached yield indexes greater than or equal to 100 in all six environments. The medium-maturing cultivar Claudio confirmed an excellent yield stability, as in the previous three-year period (2007–09).

Table 3. Yield, grain protein content and test weight of 13 italian durum wheat cultivars tested during a three-year period (2009–11) in six areas of Italy. For length of growing cycle: E = early; ME = medium early; M = medium; ML = medium late, and L = late.

		Yield							
		Index (yield/column mean*100)							**t/ha**
Cultivar	**Cycle**	**Sicily**	**Sardinia**	**South**	**Thyrrenic–central**	**Adriatic–central**	**North**	**Mean**	**Mean**
Ciccio	E	94	92	89	88	87	84	88	4.26
Duilio	E	102	103	102	101	98	100	101	4.87
Imhotep	E	103	104	99	99	95	96	99	4.77
Iride	ME	106	109	109	105	99	101	105	5.05
Saragolla	ME	103	108	107	107	99	100	104	5.02
Tirex	ME	107	105	108	109	101	104	106	5.11
Simeto	ME	98	93	95	89	89	89	92	4.43
Anco Marzio	ME	109	106	98	103	99	103	102	4.94
Latinur	M	99	102	98	92	102	95	97	4.70
Claudio	M	109	106	108	106	104	107	107	5.15
Normanno	M	100	105	102	107	102	102	103	4.98
Dylan	ML	107	98	104	108	105	107	105	5.09
Creso	L	87	83	88	90	99	91	90	4.36
Mean (t/ha)		**3.87**	**5.82**	**3.90**	**4.85**	**6.13**	**5.42**	**100**	**4.83**
		Grain protein content							
		Index (grain protein content/column mean*100)							**% DM**
Ciccio	E	96	99	100	101	104	102	101	13.2
Duilio	E	99	97	99	100	101	99	99	13.0
Imhotep	E	96	95	95	97	99	98	97	12.7
Iride	ME	97	95	95	96	97	95	96	12.6
Saragolla	ME	98	97	96	97	97	97	97	12.7
Tirex	ME	98	98	100	100	101	101	100	13.2
Simeto	ME	102	102	105	107	109	107	106	13.9
Anco Marzio	ME	100	99	99	99	100	98	99	13.0
Latinur	M	100	102	103	103	102	102	102	13.4
Claudio	M	97	98	100	100	101	101	100	13.1
Normanno	M	101	101	99	99	101	100	100	13.1
Dylan	ML	102	100	100	98	98	100	100	13.1
Creso	L	104	106	104	102	101	102	103	13.5
Mean (%DM)		12.4	12.7	12.7	13.5	13.9	13.5	100	13.1

Table 3. Yield, grain protein content and test weight of 13 italian durum wheat cultivars tested during a three-year period (2009–11) in six areas of Italy. For length of growing cycle: E = early; ME = medium early; M = medium; ML = medium late, and L = late.

		Test weight							
		Index (test weight/column mean*100)							kg/hL
Ciccio	E	101	101	101	100	100	100	100	79.6
Duilio	E	100	100	100	99	100	99	99	78.9
Imhotep	E	101	101	101	101	101	101	101	80.2
Iride	ME	100	99	100	100	100	99	100	79.0
Saragolla	ME	100	99	99	99	99	98	99	78.3
Tirex	ME	103	102	102	102	101	102	102	80.9
Simeto	ME	97	97	98	97	96	96	97	77.0
Anco Marzio	ME	102	102	102	102	102	101	102	80.8
Latinur	M	102	101	101	100	101	101	101	80.2
Claudio	M	102	102	103	103	103	103	103	81.4
Normanno	M	99	100	100	99	100	99	99	78.9
Dylan	ML	101	101	101	101	101	102	101	80.4
Creso	L	102	102	101	102	101	101	101	80.5
Mean (kg/hL)		81.5	80.6	79.6	79.0	78.9	77.8	100	79.4

The nationwide average of grain protein content was 13.1%. The greatest value was detected in Adriatic–central Italy (13.9%), and the lowest in Sicily (12.4%). Simeto and Creso, were greater than the average in every area, but this was not coupled with satisfactory grain yields. Tirex, Claudio, Normanno, and Dylan were a satisfactory compromise between high yields and good protein levels.

The national test weight mean value was 79.4 kg/hL; the best results were in Sicily (81.5 kg/hL) and Sardinia (80.6 kg/hL). As in the previous 3-year study period, the grain samples collected in northern Italy (77.8 kg/hL) had lower values. Good qualitative values were achieved by all the tested genotypes, excluding Simeto, whose average test weight for the period was 77.0 kg/hL; other values ranged from 81.4 kg/hL (Claudio) to 78.3 kg/hL (Saragolla). Claudio, Tirex, Dylan, and Anco Marzio, whose average national test weight was greater than 80 kg/hL, exceeded the local average in every area, at the same time reaching satisfactory grain yields.

Organic durum wheat: results of the 2009–11 Italian National Network Trials.

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The Research Unit for Cereal Quality of the Italian Agricultural Research Council (CRA–QCE, Rome) coördinates a national network trials for the evaluation of the overall performance of organically

Table 4. Yield, grain protein content, and test weight of 15 organically managed, italian durum wheat cultivars tested during a three-year period (2009–11) in three main cropping areas of Italy. For length of growing cycle: E = early; ME = medium early; M = medium; ML = medium late, and L = late.

		Yield				
		Index (yield/column mean*100)				t/ha
Cultivar	Cycle	South	Thyrrenic–central	Adriatic–central and north	Mean	Mean
Ciccio	E	102	99	88	96	3.06
Svevo	E	101	102	102	101	3.22
Duilio	E	105	105	105	105	3.34
Simeto	ME	102	98	90	97	3.09
Saragolla	ME	102	107	100	102	3.25
Neolatino	ME	99	97	94	97	3.08
Meridiano	ME	110	105	110	109	3.47
Anco Marzio	ME	98	115	108	105	3.34
Vinci	M	96	100	98	98	3.10
Claudio	M	107	106	105	106	3.37
Colosseo	M	105	96	104	103	3.28
San Carlo	M	97	97	101	99	3.14
Normanno	M	101	98	106	103	3.26
Dylan	ML	90	98	98	94	2.99
Creso	L	90	89	93	91	2.89
Mean (t/ha)		**3.08**	**2.85**	**3.51**	**100**	**3.18**

Table 4. Yield, grain protein content, and test weight of 15 organically managed, italian durum wheat cultivars tested during a three-year period (2009–11) in three main cropping areas of Italy. For length of growing cycle: E = early; ME = medium early; M = medium; ML = medium late, and L = late.

		Grain protein content				
		Index (grain protein content/column mean*100)				%DM
Ciccio	E	99	105	105	102	12.3
Svevo	E	105	106	105	105	12.6
Duilio	E	98	98	97	98	11.8
Simeto	ME	105	108	107	106	12.8
Saragolla	ME	95	93	93	94	11.3
Neolatino	ME	104	103	103	104	12.5
Meridiano	ME	96	95	96	96	11.6
Anco Marzio	ME	100	97	97	98	11.8
Vinci	M	99	98	97	98	11.8
Claudio	M	99	98	101	100	12.0
Colosseo	M	101	100	99	100	12.0
San Carlo	M	101	103	101	101	12.2
Normanno	M	99	96	97	98	11.7
Dylan	ML	99	98	98	99	11.9
Creso	L	103	103	100	102	12.2
Mean (%DM)		**11.6**	**12.0**	**12.7**	**100**	**12.0**
		Test weight				
		Index (test weight/column mean*100)				**kg/hL**
Ciccio	E	101	100	100	100	80.2
Svevo	E	101	101	101	101	80.6
Duilio	E	100	99	99	99	79.2
Simeto	ME	99	98	97	98	78.2
Saragolla	ME	97	98	98	97	77.9
Neolatino	ME	100	100	100	100	80.1
Meridiano	ME	98	99	98	98	78.1
Anco Marzio	ME	101	102	102	101	80.8
Vinci	M	99	99	99	99	78.8
Claudio	M	101	101	101	101	80.9
Colosseo	M	101	101	100	101	80.6
San Carlo	M	101	101	102	101	80.8
Normanno	M	99	99	99	99	79.2
Dylan	ML	101	100	101	101	80.3
Creso	L	101	101	100	101	80.4
Mean (kg/hL)		**79.9**	**80.6**	**79.3**	**100**	**79.9**

managed durum wheat cultivars, in collaboration with diverse national agencies and universities.

Between 2009 and 2011, 15 durum wheat genotypes were evaluated in 17 experimental sites, grouped in three geographical macroareas (southern Italy, Thyrrenic–central Italy, and Adriatic–central–northern Italy). Trials were carried out in a randomized complete block design with three replications.

The agronomic performance of the tested genotypes are given (Table 4, pp. 98-99). The average grain yield of these cultivars for the period 2009–11 was 3.18 t/ha. The highest value was recorded in the Adriatic central–northern Italy region (3.51 t/ha); yields were lower in the Southern (3.08 t/ha) and Thyrrenic–central Italy (2.85 t/ha) areas. Five cultivars, Meridiano, Claudio, Duilio, Saragolla, and Svevo, achieved yield indexes not lower than 100 in all three areas. Meridiano, Claudio, and Duilio, as in the previous three-year period (2007–09), had indexes that were remarkably above average in every growing area.

Grain protein content reached an average of 12.0%. Once again, the Adriatic central–northern Italy region was the highest (12.7%). Low grain protein content was detetcted in grains from Thyrrenic–central Italy (12.0%) and most of all from southern Italy (11.6%), despite the reduced grain yield in these areas. Svevo had a good protein content level in every environment, associated with good productivity. The overall good performance achieved by Simeto in southern Italy is worth highlighting.

The nationwide average test weight was 79.9 kg/hL, confirming that this technological parameter reaches satisfactory values in organically managed durum wheat also. Cultivars Claudio, Anco Marzio, and Svevo gave the highest values for test weight, associated with huge yields.

Triticale: results of 2010–11 cultivar trials in central Italy.

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The Research Unit for Cereal Quality of the Italian Agricultural Research Council (CRA–QCE, Rome) carries out field trials for the evaluation of the performance of triticale cultivars in central Italy. The aim of these trials is to provide useful informations about the quali-quantitative traits of triticale cultivars, testing at the same time their suitability to specific agroclimatic conditions. In the 2-year period between 2010 and 2011, triticale field experiments were carried out in Rome (41°58'04''N), where fields are in a tight river plain. The trials were made in a randomized complete block design with three replicates.

The agronomic performance of 19 triticale genotypes is given (Table 5). In 2011, the overall performance of all the tested cultivars exceeded that in 2010, basically due to reduced emergence rates. The average yield for the period was 4.83 t/ha. Amarillo and Trimour, two cultivars with medium growth cycles, reached yields that remarkably exceeded the average in every year; test weight values were slightly below the mean of the period. The highest test weight was in Forricale, a cultivar with a very early growth cycle, which also reached yields higher than the field average in both years.

Table 5. Growth cycle, grain yield, and test weight of 19 Italian triticale cultivars tested during a two-year period (2010–11) in central Italy.

Cultivar	Heading date (days after 1 April)	Yield (t/ha)			test weight (kg/hL)		
		Index			Index		
		2010	2011	Mean	2010	2011	Mean
Rigel	8	99	86	4.38	100	98	68.2
Forricale	9	110	102	5.06	109	106	73.7
Trica	10	97	82	4.23	97	96	66.2
Catria	11	96	83	4.24	94	91	63.5
Oceania	12	82	96	4.39	93	91	63.2
Agrano	18	83	76	3.80	97	98	66.9
Bienvenu	18	150	93	5.46	104	101	70.2
Trimour	18	115	116	5.58	99	98	67.8
Wilfried	18	114	91	4.78	101	99	68.7
Amarillo	20	133	124	6.14	100	99	68.5
Altair	22	90	95	4.50	95	97	65.8
Universal	22	82	116	5.03	103	103	70.5
Magistral	24	90	86	4.23	98	99	67.7
Maximal	24	99	108	5.06	105	103	71.3
Costant	25	86	85	4.11	105	104	71.8
Quark	27	98	93	4.58	96	96	65.9
Tulus	28	60	114	4.57	98	101	68.3
Isotop	28	72	123	5.08	102	99	69.3
Talentro	28	30	112	4.01	100	103	69.9
Mean	**19**	**3.42**	**6.24**	**4.83**	**67.2**	**70.2**	**68.7**