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SUMMARY - 1.5 million ha of durum wheat are currently grown in Italy with an average production of 4 million tons. 75% of the production, wich accounts for 66% of total production, is located in central Italy and the isles. In the North, yield is higher due to different weather and soil conditions. It should be noted that average yield has improved as a result of breeding. This paper includes a list of the main varieties grown, as well as the effects of a new EC policy concerning durum wheat and initiatives from the Ministry of Agriculture. Breeding work aims at improving both disease resistance and quality yielded so that production can be stabilized over time and durum wheat use diversified. Finally, the quality of 1993 production is compared to that of 1991/92.

Key words: *Triticum durum*, varietal evolution, breeding, yield, quality index.

RESUME - *"La production de blé dur en Italie". Actuellement en Italie on cultive 1,5 millions d'hectares en blé dur qui donnent une production moyenne de 4 millions de tonnes. Cette production, 66% du produit total, est localisée pour 75% dans le midi de l'Italie et dans les îles. Au Nord, la production est majeur ceci étant dû à la differentes conditions climatiques et de sol. Toutefois, on peut signaler que la moyenne de la production est augmentée grâce à l'amélioration génétique. Suit une liste des variétés qui ont été majeurement cultivées, ainsi que le résultat d'une nouvelle politique de la Communauté Européanne en matière de blé dur et les initiatives du Ministère de l'Agriculture intéressé à le secteur. Pour ce qui est des objectifs de l'amélioration génétique, on essaye de favoriser une meilleure resistance aux maladies, d'élever la qualité et la quantité de la production afin de la rendre la plus stable possible dans le temps et de diversifier l'utilisation du blé dur. Pour terminer, la qualité de la production de 1993 est illustrée en rapport avec celle des deux (2) années précedentes.*

Mots-clés : *Triticum durum, évolution variété, amélioration génétique, production, index qualité.*

Introduction

It is generally recognized that wheat became a cultivated plant in the Middle East about 10 thousand years ago as a diploid crop: a fortunate hybridization with a practically unknown species, followed by chromosome doubling, gave rise to a series of tetraploid wheats, among which *Triticum turgidum* L. var *durum* was the most successful in expanding largely around the Mediterranean Sea. A further expansion in areas of more temperate climates was achieved by hexaploid progenies following crossing and polyploidization of tetraploid wheats with a diploid *Aegilops.* In Italy the result was that during the Middle Ages the area cultivated with durum wheat was mainly that known as Magna Grecia, whereas bread wheat was prevalent in Central and Northern regions.

Back from the epochal journey to the New World in 1492, Columbus, among other things, delivered to Europe maize. This met in North Italy favourable growing conditions and became so well accepted for its high yield which made it expand rapidly into the Po Valley: a Venetian building of the XVI century is decorated with maize ears! Maize had a high yielding capacity which explains its adoption by Northern Italians, as well as the spreading of *pellagra*, a dietary disease due a to an unbalanced presence of maize in their foods. At the beginning of this century the maize cultivated area was superior to that of bread wheat whose yield was below that of the American crop. Only with the *green revolution* of Strampelli, after the First World War, with the expansion of his improved varieties, bread wheat occupied again the first position among the areas cultivated by the different crops in Italy, and then it was up to the last decade, when durum wheat became again the first crop as it has been during the times of the Roman Republic.

Actually the crop is grown over 1.5 million hectares with a production of about 4 million tons against

a need of 5 to 5.5 million tons. Seventy-five percent of durum area is located in the Southern and insular regions. Because the average yield is 52 and 26% less than that of the Northern and central areas, respectively (Table 1), the Southern and insular regions account only for about 66% of the total production.

Table 1. Area, production and average yield in the different regions of durum wheat cultivation in Italy in 1993 (Source: ISMEA)

Regions	Area (%)	Production (%)	Average yield (t ha^{-1})
North	6	11	5.2
Centre	18	23	3.5
South	51	46	2.5
Insular	25	20	2.8

The cause of the large differences in average yield among the regions is mainly due to the different pedology and climatic conditions. Moreover in the South: (i) weed control is not adopted by all farmers; (ii) the crop usually follows itself; (iii) low use of certified seed (only 30% is used); (iv) inadequate fertilization for the new varieties.

In spite of the previous constraints, the significant increase in the average yield obtained in the last years was mainly due to the breeding and the expansion of durum in the Northern regions (more fertile) of the country (Fig. 1).

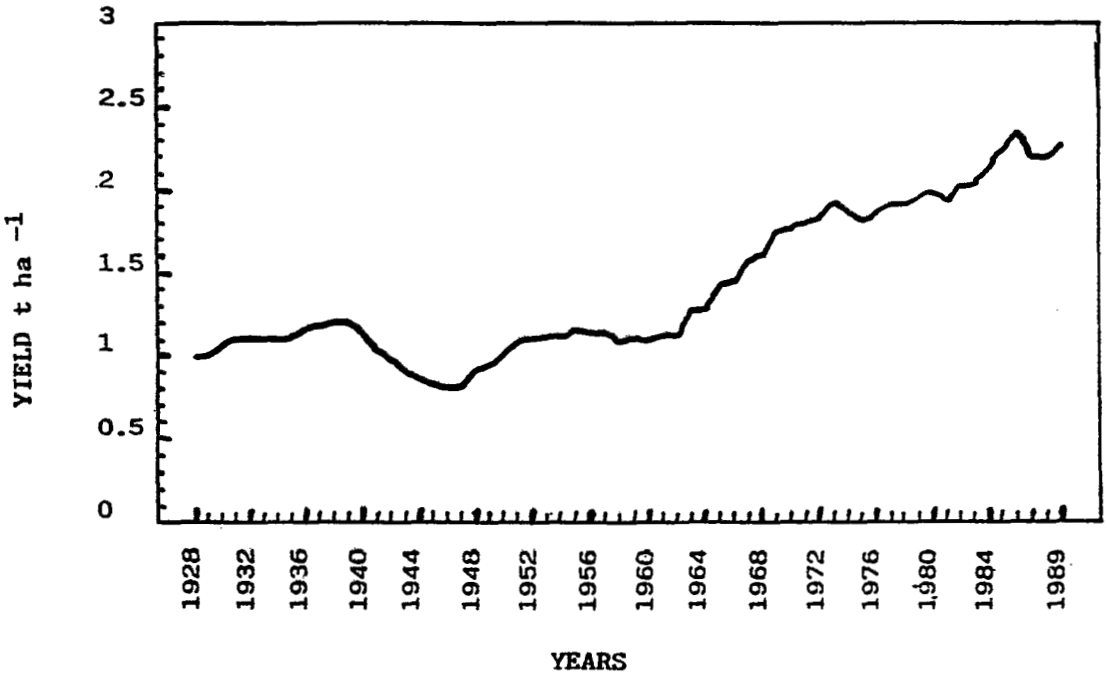

Fig. 1. Durum wheat yield (t ha^{-1}) in Italy in the period 1928-1989 expressed as five-year moving averages (Boggini *et al.*, 1992).

Effect of the new European Community policy

Durum wheat production in the European Community does not contribute to the cereal surplus; imports from USA and Canada are still considerable. Italy is the main market for the European

Community durum wheat. The Italian products of pasta have shown, in the last decade, a slow but steady increase, reaching in 1992 about 3.5 million tons with a good amount for export.

In this picture of strong contrast: weak farm structure and strong industry, the new European Community policy is aimed at adjusting the prices to the levels of the international market.

The new policy will favour not only the developing of a new agrotechnique friendly to the environment and the abandonment of poor areas but mainly to the reorganization of the farms and the programming of the production. Recently the Italian agricultural policy has dealt with: (i) revision of the list of varieties allowed to the EC contribution; (ii) use of only certified seeds; (iii) interprofessional agreement among farmer organizations, industries and seed companies. The strategy of the Ministry is to favour the diffusion of the new varieties more adapted to industrial transformation; to guarantee a qualified and homogeneous production; to make the crop more convenient in the Southern regions.

Varietal evolution of durum wheat in Italy

The varietal evolution and the improvement of the agronomic techniques must be considered as the cornerstone for increasing the grain yield in durum wheat. The intense breeding activity started at the beginning of this century, has allowed the development of genotypes as "Cappelli" and "Capeiti 8" which after a significant cultivation, also in other countries, were used as parents in breeding programmes. An important step was the development of the variety "Creso" in the 70's that has allowed the spreading of the crop in the Central and Northern area of Italy with a considerable increase of the yield. "Creso", because of its lateness, was not suitable for the Southern area. Varieties like "Valforte" and "Valnova" had an alternative fate . Later varieties as "Appio", "Arcangelo", "Latino", "Duilio", "Adamello", "Grazia" and "Norba", with good qualitative and quantitative characters obtained considerable success. Other varieties as "Simeto", "Vitron" and "Plinio" were registered at the end of the 80's.

Recently, several varieties were registered with "Ofanto" the most successful. French varieties such as "Neodur", "Primadur", "Brindur" and "Cosmodur" are also cultivated. Recently we have shown the contribution of breeding to the increase of the production. To underline the effect of the breeding on the yield, it has been considered its changing during the years when the best varieties in the comparative national trials were evaluated against the traditional ones "Appulo", "Capeiti 8" and "Trinakria". The regression line B of Fig. 2 represents the yield variation of the three traditional varieties and shows a yield increase of 12.6 quintals per hectare in the period 1974-1992 (37% of the initial yield). Since the traditional varieties are always the same, the increase must be attributed only to agronomical and technical improvement (although a selection of the best fields in the seed reproduction cultivation cannot exclude genetic components and progresses). The regression line A, for the best varieties during the period considered, shows a higher yield increase. The distance between the two lines becomes 14 quintals per hectare (it was 7 quintals in the 1974): the increase is due to the breeding activity.

In the last six years more than 50 varieties have been registered but only few were largely cultivated. Data analysis of these years, in fact, show that only few varieties are greatly successful, actually around 10 varieties cover 80% of the cultivated area.

Future objectives in breeding

In the last years the main objectives of breeding were related to the quantity and quality of the yield. The best varieties have good lodging and abiotic stress resistance together with high protein content and pasta making aptitude. Also the yellow pigment content can now be considered acceptable. Obviously, yield and quality will remain important goals of breeding especially in terms of stability. However, new items, as resistance to scab (*Gibberella zeae*), transfer of useful genes from wild species as *Triticum dicoccoides*, quality for bread making and alternative uses of durum wheat are to be considered. More details on these aspects are considered by Boggini-Di Fonzo and Pogna-Autran in this seminar.

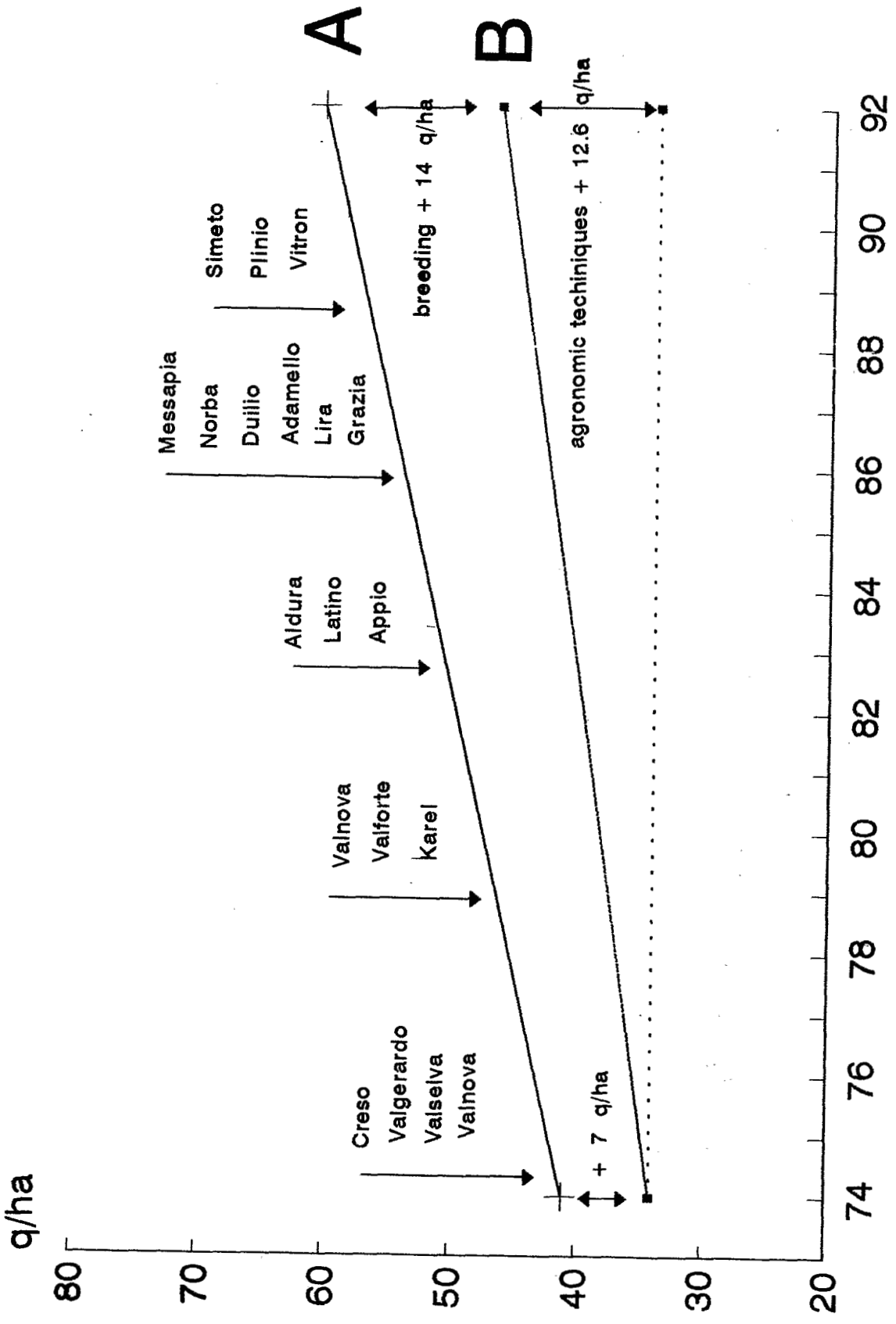

Fig. 2. Yield variation of traditional varieties in the period 1974-1992 (Bianchi and Mariani, 1993).

Milling industry

The durum wheat division is strategic in the picture of the Italian agroindustry because it represents the basis of the milling and pasta making industry. The Italian durum wheat milling industry can count on about 200 mills of high activity and on an indeterminate number of mills of low activity.

The total capacity of milling is actually of 21,000 t day^{-1}. This value is 26% higher than the annual amount milled (5.3 millions of tons). There is no coincidence between the location of the mills and of the pasta-factories. The biggest mills are mainly located in the South and Island, while the pasta factories are in the Centre and North.

The pasta-making industry has registered, in the last ten years, a 28% reduction in the number and a 16% increase in the potentiality. The reduction has interested pasta factories located mainly in the South.

Quality of yield

It is important to point out the quality characteristics of the 1993 harvesting. This year has been characterized by a favourable climate course with a positive influence on the quality:

(i) Milling value. This year the yield of mill was less satisfactory than in 1992. The percentage of stocks with yield judged as good and as very good was 44% against 50% (Table 2).

Table 2. Quality in 1992 and 1993 production in Italy (Source: Barilla)

	1993 (%)	1992 (%)
Milling value		
Very good	15	16
Good	29	34
Sufficient	56	50
Pasta-making value		
Very good	67	52
Good	23	18
Sufficient	9	24
Poor	1	6
Yellow index		
Very good	10	4
Good	47	40
Sufficient	35	41
Poor	8	15

(ii) Pasta-making value. 1993 was much better than 1992 and 1991, and similar to 1990, considered a good year (Table 2).

(iii) Yellow index. The values were the highest so far registered. The new varieties have considerable higher pigment content (Table 2), but perhaps we should consider also the nature of the pigment components, for example we should contrast the carotenes against other carotenoids as the xanthophylls.

Conclusion

The picture of the various aspects concerning durum wheat shows the importance of this crop in Italy. Nevertheless, this importance it is not generally recognized at the political level with negative consequences on the research because of the low level of funds to support it. On the contrary, some attention has been paid to the extension service with considerable results. However, the scarcity of Italian funds for research is favouring the diffusion in Italy of foreign varieties. Therefore, it is suggested that more attention should be given to the various aspects dealing with the durum wheat production.

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