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IMPROVEMENT OF DURUM WHEAT GENOTYPES WITH DIFFERENT STARCH COMPOSITIONS BY MODULATING THE SEED HARDNESS

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Cereals, staple crops in human nutrition, are called to face manifold challenges to encounter the urgent demand of food along with a higher nutritional value ensuring the sustainability of the supply chain. In this view, research focuses on two main topics; firstly, the rise in productivity, balancing the growing demand of food, consistent with the availability of environmental resources. The second issue regards the urgency to properly cover the nutritional needs of the population which has become more sensitive to pathologies related to high-calorie eating habits and poor in valuable nutritional compounds. Faced with such important issues, it is desirable to adopt a full approach, based on projects aimed at satisfying multiple requests at once.

The research here discussed concerns the development of three durum wheat genotypes in which novel properties have been combined both in the health-functional profile of the derived foods and in the milling characteristics of the grain. The project involves a group of durum wheat genotypes, in which the starch component has been modified in the amount of amylose, a polysaccharide that, together with amylopectin, constitutes the reserve starch. The high amylose genotypes are of interest due to the low glycemic profile and the prebiotic functionality of the derived foods depending on the increase in “resistant starch"; the amylose-free genotype is suitable for the design of highly digestible foods ideal for specific uses, such as nutrition for infants. These genotypes were, therefore, the subject of a further improvement breeding program focused on modifying the hardness of the seed associated with the efficiency and sustainability of grinding and the quality of the final products.

In detail, three different genotypes of durum wheat have been selected:1) Soft Svevo /Sv SSIIa and 2) Soft Svevo/Sv SBEIIa combine a high amylose content with a softer kernel that results in increased resistant starch content and energy saving during the milling process. The third genotype, Soft Svevo/Sv Waxy, combines a softer kernel with free amylose starch following a novel starch digestibility profile suited for specific food categories.

A marker-assisted selection based on HRM-genotyping has been performed to identify the homozygous mutants in the progenies of the three different crosses.

Biochemical analyses such as the determination of total starch, resistant starch, starch damage, ?-glucan and arabinoxylan content are in progress and will be able to highlight the potential value of the selected genotypes.