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Durum Wheat Pasta with a Good Quality and a Reduced Nitrogen Fertilization: Is it Possible?

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It is generally admitted that durum wheat pasta quality is greatly influenced by both protein content and composition. Durum wheat crops need high nitrogen inputs to produce grains with protein content required by manufacturers. With increasing fertilizer price and facing new environmental constraints, farmers have to modify their practises. Modifying practices is not always sufficient to maintain a high yield level with acceptable protein content so the need to create cultivars with better nitrogen use efficiency becomes necessary. The objective of breeders is now to create new durum wheat cultivars able to grow up with limited nitrogen intake and to remobilize efficiently nitrogen from vegetative organs of the crop to grains during filling with the need to fulfil quality criteria required by pasta making industries. In this context a study was undertaken by French breeders in association with public research, development organizations and pasta manufacturers in order to define minimal requirements in terms of protein quantity and quality to produce pasta able to satisfy consumers. Eight cultivars were grown during two years in the south of France with nitrogen intakes varying from 0 to 360 units. At harvest, grain characteristics (thousand kernel weight, specific weight, yellow berry...) were determined. Protein content and composition measured by size exclusion-chromatography were also evaluated along with gluten index, SDS sedimentation test. Semolina were produced and used to make spaghetti and dough discs. Pasta quality was evaluated through different measurements (texture, color, smoothness and appearance, cooking losses...) before and after cooking. A statistical analysis was then performed and shown that it is possible to reduce nitrogen fertilization to some extent without affecting dramatically pasta quality. Data also provide useful information to reconsider tests used during breeding programs to predict the end use quality of durum wheats.

Keywords: durum wheat,pasta,quality,nitrogen fertilization,low input