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NEW POTATO VARIETIES FOR OFF-SEASON PRODUCTION: A SUCCESS OF ITALIAN BREEDING

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Potatoes can be produced almost all year round in Italy and in the Mediterranean basin due to the great diversity in eco-geographic conditions and habitats of their regions. In the North it is possible to grow ware potato in classical period (March-August). On the contrary in the South, potatoes can be grown twice a year (double cropping): in the spring season (planting from middle of November to January and harvesting from middle of April to early of June); in the autumn season (planting in early of September and harvesting in December-January). Problems caused by water shortage, frost and biotic stress have severe implications for potato production. The objective for the "new Mediterranean potato" must be the availability of potato cultivars for each environment/planting season. Breeding programmes have been set up in the middle of 1990's, in the frame of a national project granted by the Italian Ministry of Agriculture, and led to development of varieties improved for the off-season production in Southern Italy. Crossing of divergent parents, screening of segregant progenies and agronomical validation of advanced breeding clones have been performed. Crosses between parents with complementary features were carried out in order to maximize genetic variability and to exploit it by phenotypic selection. Screening of segregant progenies included: seedling generation in the glasshouse; first and the second clonal generations in spaced plants at high-grade seed site; third clonal generation in replicated trials performed in parallel at sites located in the main extra-seasonal potato production areas (Sardinia, Sicily, Apulia, Campania). The cultural details, standard in all sites, included yield evaluation of tubers and visual assessment of each plot; the score ranging on a 1 (low) to 9 (high) scale for tuber size, uniformity and regularity of shape (appearance), resistance to growth cracking and to common scab. New varieties have been named and released ('Rubino', 'Zagara', 'Daytona', 'Antea', 'Silvy'): medium-early variety well suited to extra-seasonal cropping, with excellent presentation, highly productive with clear smooth skin and good culinary quality. Breeding clones exhibiting resistance to relevant biological stress have also been developed; one of them ('ISCI B 26', recently named 'Ninfa') performed well in organic farming (good tolerance to late blight); in such system, storage of tubers is performed at low temperatures (below 7-8°C), being banned any chemical to suppress the sprouting. The challenge is to prevent accumulation of reducing sugars in the tubers responsible for dark colour in the frying product. Genetic efforts have been made to elucidate the cold sweetening by transcript profiling of the early events associated with this physiopaty (heterologous microarray approach). Cold-responsive enzymes previously reported to take part to cold-induced sweetening based on biochemical features (as substrate specificity) are now identified at the sequence level. In addition to β-amylase, invertase, flavonoid/anthocyanin and redox genes, a striking number of

known ethylene-and ripening associated genes accumulated transcripts according to validate GeneChip dataset. Such induction was confirmed and monitored over 26-time course by qPCR. Finally, the suitability of such developed varieties also for other Mediterranean area (Egypt, Tunisia, Marocco, Israel, Lebanon, Cyprus) can speed up the modernization of the potato chain in raising economies where population is increasing. The Southern Mediterranean countries should take advantage of the new scenarios and the business in the fresh potatoes could expand significantly with economic return for Italian enterprises as supplier of improved varieties and seed tubers.