



STUDY ON ADAPTABILITY OF BLUEBERRY CULTIVARS TO THE CALCAREOUS GROUND IN CENTER - SOUTH EUROPE

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Berry are the most important antioxidant fruit, blueberries in particular have a high value of antioxidant activities (Scalzo et al, 2005). The phenolic compounds are able to protect organisms against oxidative stress induced by free radical species (Chao, Howard, Prior, & Clark,2004). Anthocyanins are the most important group of water-soluble pigments in plants and also they are able to protect against disease (Hou, 2003). The European countries have significantly different growing conditions, climate and consumer requirements for berry cultivation. One of the most important objective of breeding is to find germplasm that has valuable characteristic combinations as a breeding resource for the production of improved berry cultivars or that is of direct interest for commercial use. In the last years, the extension of blueberry production is increasing really a lot because of a very high increase of consumer demand. The increased demand of blueberry cultivation areas is limited by the reduced adaptability of the most common varieties to different soils and climates. The availability of new varieties with an increased adaptability to different cultivation conditions is now an important need.

This study aims to identify the better varieties for the cultivation in the south part of Europe, starting from 13 blueberry cultivars and 6 selections of northern highbush, southern highbush and a Rabbiteye new *Vaccinium* southern bush selection, derived from the breeding program of The New Zealand Institute for Plant & Food Research Ltd, were also included. These genotypes were studied for the capacity to maintain better yield and fruit sensorial and nutritional quality in the south climates and chalky soils with high pH, amended with acid peat and specific fertigation program.



The field was planted in 2010 and data reported are referred to 2012 and 2013 harvests. For each season were recorded data on total plant production, average fruit weight and fruit diameter. For fruit sensorial and nutritional quality were detected: soluble sugars (° Brix) and Tritable Acidity, Total antioxidant capacity (TAC: FRAP), total polyphenols (TPH) and anthocyanins (ACY) content.



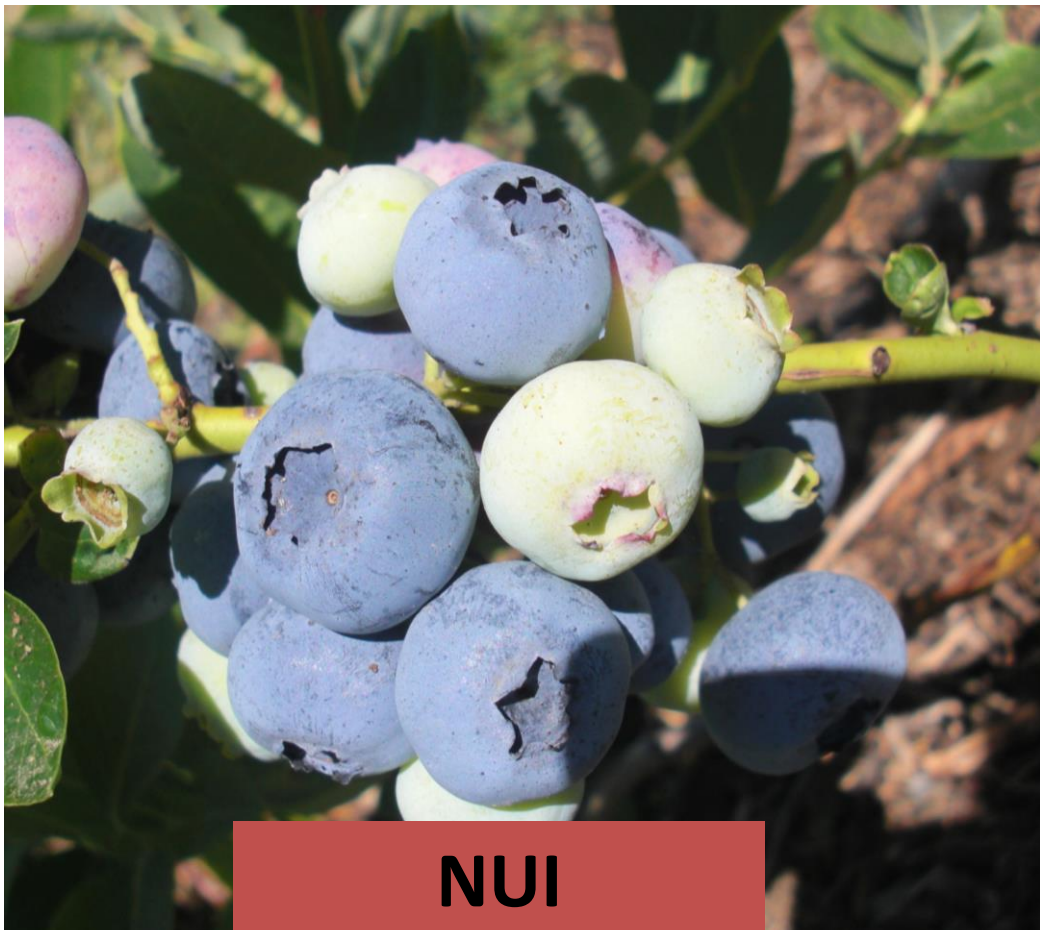
HARVESTING SEASON

The climatic conditions promoted an early flowering and fruiting season, at least two weeks in comparison with the Italian northern production area. The combination of different genotypes resulted with an extended harvesting period, from first week of June to the first week of August.

PLANT PRODUCTION AND FRUIT SIZE

The highest fruit production per plant was detected for Reka (1608 g/plant), followed by the selection P&F075 (1160 g/plant), Patriot (981 g/plant) and Blue Ray (992 g/plant). Other genotypes showed the interesting production but these 4 for sure results as the more adapted to the soil and climatic conditions of our location. Important differences were also detected for the fruit size and weight. RH38 produced fruit with the highest weigh (3 g) and diameter (20.6 mm), followed by Cosmopolitan (3.05 g and 18.0 mm) and Nui (2.95 g and 18.8 mm).

Cultivars/Selections	Average Fruit Weight (g)	Production (g/plant)	Fruit diameter (mm)
BLEU RAY	2.35	992	17.0
BLEU SILK	2.39	862	16.7
BLEUCROP	1.82	503	15.6
CIPRIA	2.15	780	17.8
COSMOPOLITAN	3.05	839	18.8
DUKE	2.14	972	16.9
EARLY BLEU	1.60	729	14.9
HORTBLEUPETITE	1.13	493	11.9
NUI	2.95	799	18.0
PATRIOT	2.27	981	17.2
POPPINS	1.49	752	15.4
REKA	1.87	1608	15.4
ROXY BLEU	2.03	816	17.4
RH38	3.00	549	20.6
RH52	2.50	584	17.7
RH55	2.30	697	17.7
P&F005	2.09	1160	17.7
P&F075	2.59	491	16.9
P&F158-10	1.09	446	13.7



Cultivars/Selections	Soluble Solid (°Brix)	Tritatable Acidity (meqNaOH/100g)	FRAP (uM/g FW)	TPH (GA mg/kg)	ACY (mg/Kg FW)
BLEU RAY	13.2 abcd	11.1 ab	15.56 bcd	1944 def	1203 efg
BLEU SILK	13.1 abcd	16.0 ab	16.29 bcd	2027 de	1252 def
BLEU CROP	13.2 abcd	17.1 ab	14.94 bcd	1785 defg	1046 fgh
CIPRIA	11.5 bcde	13.1 ab	13.8 bcde	1484 ghi	1054 fgh
COSMOPOLITAN	11.6 bcde	18.8 a	14.73 bcd	1824 defg	1414 cd
DUKE	11.5 bcde	10.9 ab	16.28 bcd	1877 defg	1300 cde
EARLY BLEU	12.7 abcde	10.6 b	16.8 bcd	1922 def	1443 c
HORTBLEUPETITE	13.5 abc	16.3 ab	18.11 bc	2512 c	1480 c
NUI	13.0 abcd	14.7 ab	17.86 bc	2209 d	1485 c
PATRIOT	11.7 bcde	13.5 ab	15.35 bcd	1838 defg	1125 efgh
POPPINS	13.5 abc	12.0 ab	11.95 de	1407 hi	1085 fgh
REKA	11.3 cde	14.1 ab	15.16 bcd	1859 defg	1068 fgh
ROXY BLEU	11.3 cde	10.6 b	15.18 bcd	2186 d	1185 efg
RH38	11.1 de	14.6 ab	9.88 e	1199 i	717 i
RH52	11.1 de	14.7 ab	14.13 bcde	1684 efgh	902 h
RH55	10.8 e	16.3 ab	13.41 cde	1822 defg	986 gh
P&F005	12.1 abcde	12.9 ab	19.09 b	1592 fgh	980 gh
P&F075	13.7 ab	13.0 ab	22.47 a	2891 b	1744 b
P&F158-10	14.2 a	16.3 ab	25.42 a	3164 a	2418 a

FRUIT SENSORIAL AND NUTRITIONAL QUALITY

Fruit of Bleu Silk, Bleu Crop and Hortbleupetit had highest values of SS and Tritable acidity, while Bleu Ray, Hortbleupoppins and P&F075 to the highest values of soluble solids corresponded a lower value of tritable acidity, thus resulting with a more equilibrated sensorial quality. Fruit quality of Nui, Early Bleu and P&F158-10 was also interesting.

The new breeding selections P&F158-10 and P&F075 produced fruit with the highest values of TAC and the highest contents of total Polyphenols and Anthocyanins. These new genotypes can be considered really interesting for the potential health benefits to the consumer. Among the new varieties, fruit of Hortbluepetit has the highest nutritional values (high TAC, TPH and ACY), followed by Nui, Bleu Silk, Duke and Bleu Crop. Interesting nutritional values were detected also for fruit of Early Bleu, Bleu Ray, Patriot, Reka and Roxy Bleu.

The results are demonstrating that some commercial blueberry cultivars and new selections already have good adaptability to southern conditions and even to high pH soil, clearly with the adoption of soil amendments and fertigation for soil acidification. Reka is the most adaptable and productive variety in these conditions, followed by Patriot and Blue Ray, all having fruit with interesting sensorial and nutritional quality. Other varieties had more equilibrated and interesting sensorial quality. The two new selection P&F158-10 and P&F075 can offer a high potential in generating new varieties with really improved health values for the consumer. A more focused breeding program can bring to the production of new varieties able to offer high yielding and quality in these limiting cultivation conditions for blueberry.

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