IHC
Lisboa 2010

SCIENCE AND HORTICULTURE FOR PEOPLE

ABSTRACTS · Volume II (Symposia)

28th International Horticultural Congress

Lisbon Congress Centre | August 22–27, 2010

www.ihc2010.org

ISHS
International Society for Horticultural Science

S07.231

Phytochemical Composition and Antioxidant Properties of Portuguese Kale and Portuguese Tronchuda Cabbage Produced in a Sustainable Agriculture Production System Are Affected by Climate Conditions

Aires, A.[1]; Carvalho, R.[2]; Fernandes, M. C. C.[3]; Saavedra, M. J. F.[4]; Rosa, E.[1]

[1]CITAB-CENTRE FOR THE RESEARCH AND TECHNOLOGY FOR AGRO-ENVIRONMENT AND BIOLOGICAL SCIENCES. AGRONOMY DEPARTMENT, UNIVERSITY OF TRÁS-OS-MONTES E ALTO DOURO, P.O. BOX 1013, 5001-801, VILA REAL, PORTUGAL

[2]ECAV-AGRONOMY DEPARTMENT, UNIVERSITY OF TRÁS-OS-MONTES E ALTO DOURO, P.O. BOX 1013, 5001-801 VILA REAL, PORTUGAL

[3]CIMO- MOUNTAIN RESEARCH CENTRE. ESCOLA SUPERIOR AGRÁRIA, INSTITUTO POLITÉCNICO DE BRAGANÇA, CAMPUS DE STA APOLÓNIA, P.O. BOX 1172, 5301-855 BRAGANÇA, PORTUGAL

[4]ECAV-VETERINARY AND ANIMAL SCIENCE RESEARCH CENTER. DEPARTMENT OF VETERINARY SCIENCES, UNIVERSITY OF TRÁS-OS-MONTES E ALTO DOURO, P.O. BOX, 5001-801 VILA REAL, PORTUGAL

The aim of this study was evaluate the biological role of Portuguese kale and tronchuda cabbage comparing with broccoli inflorescences, one of the *Brassica* plants with biological role already well established. Understand which the main components are directly associated with antioxidant activity and how the different climate conditions affect their average levels is another objective. The plant material used in this research was produced under field conditions in two different climate seasons, Spring-Summer (SS) and Summer-Winter (SW) during two consecutive years. The average content of total phenolics, total flavonoids, L-ascorbic acid (vitamin C), glucosinolates and minerals (Fe, Zn and Se) directly associated with the antioxidant activity were evaluated. Spectrophotometric, spectrometry and HPLC system methods were used to measure the average contents of the above components. The antioxidant activity was evaluated using the DPPH method and respectively IC50 values were estimated by a curve dose-response. Our results showed that Portuguese kale and Portuguese tronchuda cabbage exhibited high antioxidant activity with 80.6 and 82.2 of % inhibition of DPPH radicals respectively, and 1.49 and 1.97 mg×mL^{-1} of IC50 average values respectively. These values were very similar to those obtained for broccoli (81.9 % of inhibition of DPPH radicals 1.97 mg×mL^{-1} of IC50 average level). Our results showed that climate seasons affected directly ($P<0.001$) the concentration of the bioactive components and thereby the antioxidant activity. Based on IC50 average values, all brassicas showed high antioxidant activity in SS seasons. In this season the high antioxidant activity were directly assigned to high levels of total flavonoids ($P<0.001$), total phenolics ($P<0.01$), glucoiberin ($P<0.01$), glucobrassicin ($P<0.01$), total glucosinolates (between $P<0.05$ and $P<0.001$) and zinc ($P<0.01$). Based on our results we can state that *Brassica* plants can provide considerable amounts of bioactive components and may constitute an important source of natural dietary antioxidants.

S07.232

Effects of Temperature and Light/Dark Cycle on the Growth and Vitamin C Concentration of Lettuce

Lopez, A.; Hellin, P.; Fenoll, J.; Flores, P.

IMIDA, C/MAYOR S/N, LA ALBERCA, 30150, MURCIA, SPAIN

Vitamin C present in plant foods acts as line of defence against oxidative stress. As a result, it protects cells against oxidative damage, and may therefore prevent chronic diseases, such as diabetes, cancer and cardiovascular disease. The content of vitamin C, measured as the sum of ascorbic acid (AA) plus dehydroascorbic acid (DHAA), is used as an index of health-related quality of vegetables, so that interest in the simultaneous analysis of AA and DHA emerged. On the other hand, vitamin C is extremely sensitive to environmental factors such as temperature and light. The objective of this study was to determine the effect of temperature and light/dark cycles, on growth and vitamin C concentration of lettuce (*Lactuca sativa* L.). Plants were grown in a growth chamber with controlled-environment conditions under different temperatures day/night (23/15, 20/12 and 15/8 °C) and different light/dark cycles (16/8, 12/12 and 8/16 h). Vitamin C (AA and DHAA) was analysed using liquid chromatography tandem-mass spectrometry (LC-MS-MS) with triple quadrupole in selective reaction monitoring (SRM) mode for the simultaneous determination of AA and DHAA. Negative ion mode of ESI and MS/MS transitions of m/z 173→143 and m/z 173→71 for AA and m/z 175→115 and m/z 175→87 for DHAA were used. Lettuce growth was influenced by both light and temperature. The increase of the day/night temperature from 15/8 to 23/15 °C and the increase of the light period from 16 to 8 h led to increases in weight by 45% and 32%, respectively. The effect of temperature and amount of light during the growing period on vitamin C concentration is discussed on the basis of their effect on availability of sugars for AA synthesis.

S07.233

Soluble Sugar and Organic Acid Concentration in Lettuce as Affected by Temperature and Light/Dark Cycle

Lopez, A.; Hellín, P.; Fenoll, J.; Flores, P.

IMIDA. C/MAYOR S/N. LA ALBERCA, 30150, MURCIA, SPAIN

Several metabolic processes involved in carbon metabolism, such as the synthesis and accumulation of sugars and organic acids, may be affected by environmental factors including temperature and light. The aim of this work was to determine the effect of temperature and light/dark cycles, on sugars and organic acid accumulation in lettuce (*Lactuca sativa* L. cv. Little Gem Ferro). Plants were grown in a growth chamber with controlled-environment conditions under different temperatures day/night (23/15, 20/12 and 15/8 °C) and different light/dark cycles (16/8, 12/12 and 8/16 h). Soluble sugars were analysed by liquid chromatography (LC) equipped with a refraction index detector (IR). Organic acids were analysed by LC tandem-mass spectrometry (MS-MS) in negative ion mode of ESI. Sucrose, glucose and fructose were the main sugars found in lettuce. Citric, malic, tartaric and succinic acids were detected among other organic acids. An increase of the light period led to an augment in the concentration of soluble sugars, attributable to the fact that light increases photosynthetic capacity of lettuce leaves and therefore the accumulation of soluble sugars. On the other hand, the increase in day/night temperature slightly increased the concentration of glucose and fructose, while there was a slight decrease in the concentration of sucrose. As far as organic acids are concerned, their concentration decreased when the light period was extended and increased when the temperature day/night was higher than 15/8 °C.

S07.234

Phosphorus Sources Influence Celosia Nutritional Qualities in the Tropics of Africa

Ojo, D. O.

NIHORT, PMB 5432, IDI ISHIN, 200001, IBADAN, NIGERIA

Celosia is process into many food items, supplements and additives. Thus important for diversification and improving the food basket, thereby contributing to food security and industrial usage in sub Saharan Africa where poverty is endemic. Celosia is also drought tolerant and highly adaptable as a potential crop in the tropics. This experiment was therefore carried out to elucidate the influence of phosphorus (P) sources on amaranth producivity in the African tropics. The experiment was RCBD design with four replications. The P sources treatment: control with no phosphorus (P), single super phosphate (SSP), ogun rock phosphate (ORP) and sokoto rock phosphate (SRP) were randomly allocated. Results revealed that SSP had significant higher 1000 grain weight, protein and starch contents in the seedbut compared to the control with no P, ORP and SRP. ORP and SRP had similar no significant 1000 grain weight, protein and strach contents in seed. Percent fat and sugars contents in grain follow the order: ssp>orp>srp sources. Percent fibre, vitamins D and E decreased among P sources in the order control>ssp>orp>srp. SSP was therefore recommended for optimal quality value in Celosia productivity.