Physiological Evaluation of the Anti-Diabetic Properties of Morinda lucida

Mohammed Devali and Abdulla Hassen
Department of Biological Science, Federal University of Agriculture, Abeokuta, Ogun, State, Nigeria Box.2240.Abeokuta . Nigeria.

ABSTRACT

The search for more effective hypoglycaemic agents continues to be an area of research interest. World Health Organization recommended the use of alternative therapy especially in countries including, Nigeria, where access to conventional treatments of diabetes is inadequate. Majority of people in Abeokuta were majorly peasant farmers and petty traders who could not afford high cost of pharmaceutical remedies of diabetes which is very rampant as a result of poor feeding pattern. However, naturally endowed plants such as Hibiscus sabdariffa are found everywhere, parts of which are taken as vegetables without putting into consideration its hypoglycemic advantages. However, this study could assist in providing some information needed for the health improvement of the rural populace (Abeokuta) as regards diabetes. Combination of 300g M. lucida + 100g A.sativum+l00g Z. officinale produced the best hypoglycaemic effect (69.85%) in alloxan-induced diabetic rats.

Introduction

Diabetes mellitus (DM) is a chronic disorder of carbohydrate, lipids and protein metabolism characterized by persistent elevation of fasting blood glucose greater than 200mg/dl due to partial or complete termination of insulin synthesis or resistance to insulin actions (Murray and Pizzorno, 1997). The disease can occur also as a result of lack of insulin or due to the presence of the factors that oppose the action of insulin (Murray and Pizzorno, 1997). It manifests as hyperglycaemia and characterized by a relative or absolute lack of insulin.

It is a disease in which the body either does not produce or does not properly utilize insulin. This is due to deficiency in action of insulin and possibly abnormal high amount of glycogen and other insulin antagonizing substances such as growth hormones. Clinically, diabetes mellitus represents a syndrome with disordered metabolism and inappropriate hyperglycemia due to a reduction in the biological effectiveness of insulin.

Diabetes mellitus and its associated complications have significant impact on health, quality of life and life expectancy of its sufferers. The frequency may escalate with a major impact on the population of developing countries due to the absence of effective and affordable interventions of diabetes mellitus drugs. Recent statistics showed that the global epidemic of diabetes mellitus is worse and its greater in developing than the developed countries (Oputa, 2002).

In 1998, World Health Organization estimated that approximately 120 to 140 million people are globally affected by diabetes mellitus. In 2000, this figure increased to more than 177 million and increased to 221 million by 2010 (Amos et al., 1997) and may also be doubled by the year 2025 if positive actions are not taken (King et al., 1998; Kalda et al., 2008). The figures showed that diabetes is a global health concern that requires serious effort by all nations towards arresting its scourge.

In response to this global health challenge, the search for more effective hypoglycemic agents continues into research interest most especially in countries where access to conventional treatment of diabetes is inadequate (WHO, 1980). Among the Yoruba herbal practitioners, fresh leaves of the plant are often macerated in palm-wine and its bitter decoction is used in the oral treatment of suspected diabetic patients usually for a few days. In the-present study, lml/kg/day of 50-125g and combined treatment of various parts of Morinda lucida was investigated for its oral hypoglycemic activities in normal and alloxan3flC induced diabetic male Wistar rats for 17 days.

Plant material and experimental design

The seed bulbs of fifteen garlic (Allium sativum L.) varieties were obtained from Egypt. The experiment was carried out at the farm of the Faculty of Agriculture, "Slok" zone, University of Benghazi, Libya. Before planting, the seed bulbs were vernalized in a cold chamber at 4°C and 80% humidity for 30 days. This treatment has been done to improve the growth and yield of garlic plants. Experiments were set up in a randomized complete block with two replications. Every genotype in 5 rows and 15cm intervals and 3 meter in width were planted in first week of November, 2012. Immediately, after planting the field was irrigated to soil moisture and all other standard agronomic practices were applied to the genotypes. Harvesting of the plant was done in the middle of March, 2013.

Estimates of phenotypic correlation coefficients among the component traits of garlic. The correlation studies revealed that, bulb yield was positively and significantly correlated with fifth leaf length, fifth leaf width, false stem weight, leaf area, total dry weight, bulb diameter and bulb height indicating that selection based on these traits will help in increasing the yield (Table 4).

Godhani and Singh (2000), Naruka and Dhaka (2004) and Dubey et al. (2010) have also reported similar significant positive correlation between bulb yield with bulb diameter, bulb size and total dry weight.Bulb diameter was significantly and positively correlated with fifth leaf length and width, false stem

Tele:
E-mail addresses: mohammeddevali123@gmail.com

weight, leaf area, total dry weight and bulb height. It is suggested that, if leaf area increased then bulb diameter will be increased. It may be concluded from the correlations that, the traits, fifth leaf length and width, false stem weight, leaf area, total dry weight, bulb diameter and bulb height are correlated to each other and helpful in increasing in the bulb yield as reported earlier by Dhar (2002) and Tsega et al. (2010).

The use of plants as remedies is common and widespread in Nigeria. This is due to ecosystems which are naturally endowed with arrays of floristic composition of different plant forms and resources (Olajide, 2003), thus enabling them to increase interest in traditional practices of health care as a complement to biomedical health care and part of primary health care delivery system in Nigeria (Akerele, 1988; Bodeker, 1994; Cunningham, 1993; Sheldon el al., 1997). According to the World Health Organization, an estimated 3.5 billion people in the developing world depend on plants as part of their primary health care (Balick and Cox, 1996).Moreover, in Nigeria, inadequate access to Othodox medicines and physicians coupled with expensive cost of drugs had led to about 70 per cent of the population relying greatly on different plants to meet their health care services (Kesparek, 1997; Farnsworth, 1988; Ugbogu and Odewo, 2004; Koduru et al., 2007). This is because traditional medicine has more benefits than other health care systems, as it is cheaper, readily available and could cure diseases permanently (Olapade, 1995).

Conclusion

The multiple statistical procedures which have been used in this study showed that the bulb diameter, bulb height and cloves/bulb were the most important yield variables to be considered under the target environmental conditions. This was clear with all used statistical procedures. Thus, high yield of garlic plants under Slok environmental conditions in Libya can possibly be obtained by selecting breeding materials with these aforementioned three variables.

References

Barad, Y.M., K.B. Kathiria and K.G. Modha, 2012. Correlation and path coefficient studies in garlic(Allium sativum L.) over different environments. Vegetable Science, 39: 79-82.

Dhar, S., 2002. Genetic variability and character association in garlic. Prog. Hort., 34: 88-91.

Dubey, B.K., R.K. Singh and S.R. Bhonde, 2010. Variability and selection parameters for yield and yield contributing traits in garlic (Allium sativum L.). Indian J. Agric. Sci., 80: 737-741.

Etoh, T. and P.W. Simon, 2002. Diversity, fertility and seed production of garlic. p. 101-117. InRabinovitch, H.D., and L. Currah (eds.) Allium crop science: Recent advances. CABI Publishing, Wallingford, UK.

Figliuolo, G., V. Candido, G. Logozzo, V. Miccoli and P.L. Spagnoletti-Zeuli, 2001. Genetic evaluation of cultivated garlic germplasm (Allium sativum L. and A. ampeloprasum L.). Euphytica, 121: 325-334.

Godhani, P.V. and S.P. Singh, 2000. Genetic variability, correlation and path coefficient studies in garlic (Allium sativum L). In: Singh, K., Lawande, K.E., Pandey, U.B., Singh, L. and Bhonde, S.R. (Eds.). Approaches for Sustainable Development of Onion and Garlic, Proceedings of the National Symposium on Onion and Garlic, Production and Post Harvest Management, Challenges and Strategies, Nashik, November 19-21, 2000 (pp. 95-98). National Horticultural Research and Development Foundation, Nashik.

Hair, J.F., R.E. Anderson, R.L. Tatham and W.C. Black, 1992. Multivariate data analysis. Macmillan Publishing Company, New York.

Ipek, M., A. Ipek., S.G. Almquist and P.W. Simon, 2005. Demonstration of linkage and development of the first low-density genetic map of garlic, based on AFLP markers. Theor. Appl. Genet., 110: 228-236.

Kohli, U.K. and M. Nutan, 1993. Yield performance and correlation studies in garlic - A note. Haryana Journal of Horticultural Sci., 22(2): 163-165.

Myers, R.H., 1986. Classical and modern regression with applications. Boston: Duxbury.

Naruka, I.S. and R.S. Dhaka, 2004. Correlation studies in garlic (Allium sativum L.). Prog. Hort., 36: 128-131.

Rahman, A.K. and M.K. Das, 1985. Correlation and path analysis in garlic. Bangladesh J. Ahric. Research, 10: 50-54.

Singh, J.P. and S.B. Singh, 1999. Evaluation of different selections/varieties of garlic for yield and some yield contributing parameters, Crop Research, 18(2): 216-217.

Singh, R.K., B.K. Dubey, S.R. Bhonde and R.P. Gupta, 2011. Correlation and path coefficient studies in garlic (Allium sativum L.), Journal of Spices and Aromatic Crops, 20(2): 81-85.

Snedecor, G.W. and W.G. Cochran, 1981. Statistical Methods, seventh ed. Iowa State University Press, Iowa, USA.

Tesga, K., A. Tiwari and K. Woldetsadik, 2010. Genetic variability, correlation and path coefficient among bulb yield and yield traits in Ethiopian garlic germplasm. Indian J. Hort., 67: 489-499.