

Quality Assessment & Essential Nutrient Preservation of Three Dried African Indigenous Vegetables (AIVs)



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1. Introduction

The drying and packaging of leafy green vegetables is a valuable postharvest marketing strategy to enter additional marketplaces, preserve the fresh produce and generate additional income streams. The dried products are also then available to consumers year round beyond any growing season. The quality of the dried products is dependent upon the quality of the incoming fresh materials, the handling, cleaning sorting and drying process. These processes can impact the cleanliness and safety as well as the color. As visual quality can impact the acceptance and desirability of the dried AIV, this study was conducted in support of Mace Foods, Eldoret to provide additional foundational information in support of their quality control program.

Essential to assessing the value of these products and the process of the drying and packaging thereof is the preservation of essential nutrients in the diet, as well as basic quality assurance in presentation and cleanliness of these foods. Thus, In this report we analyze quality control parameters such as moisture, ash, acid insoluble ash, as well as color and foreign matter. Elemental analyses were performed by Penn State laboratories. This work is being done as a first step and in parallel to conducting a nutritional proximate analysis, antioxidant screens, total phenols, total carotenoids, and tocopherols. Together, such support can assist in the development of a nutritional label that can be put on the packaging of each dried vegetable that will both provide more nutritional information to the consumer and also facilitate entrance into export markets. That increase in market demand, will then support more local production of the AIVs in the HortCRSP targeted communities.

2. Materials and methods

Samples were provided by Mace Foods, Eldoret, Kenya, one of our private sector partners who specialize in dried AIVs.

Spider Plant (Saga) *Gynandropis gynandra* (AIV 12059)
Black Nightshade (Managu) *Solanum nigrum* (AIV 12060)
Amaranth (Dodo) *Amaranthus retroflexus* (AIV 12070)
Cowpea Leaves (Kunde) *Vigna unguiculata* (AIV 12062)

Total moisture

Around 1 g of ground sample was enveloped in foil and placed in oven at 90° C for 4 days. The difference in mass was used to calculate the percentage of moisture prior to being place in oven. Samples were analyzed in triplicate.

Ash and acid insoluble ash (AIA).

Around 2 g of ground sample were placed in Whatman ashless filter paper, placed in crucibles and heated to 500° C for 5 hrs. The remaining mass of the samples was used to calculate total ash %. The samples were then boiled in 80% HCl for 5 minutes, the solution filtered in Whatman ashless filter papers, heated to 500° C for 5 hrs. The mass of the samples were then recorded and used to calculate acid insoluble ash %. Samples were analyzed in triplicate.

Elemental analysis.

Elemental analysis was performed by Penn State with triplicate samples prepared by NUANPP laboratory.



Table 1. Moisture, Total Ash, Acid Insoluble Ash

Species	Moisture (%)	Total Ashes (%)	AIA (%)
Spider Plant (Saga) <i>Gynandropis gynandra</i>	11.8 SD 11%	8.35 SD 3.0%	0.75 SD 7.6%
Black Nightshade (Managu) <i>Solanum nigrum</i>	13.7 SD 68%	7.61 SD 9.3%	0.69 SD 11%
Amaranth (Dodo) <i>Amaranthus retroflexus</i>	9.71 SD 4.2%	14.3 SD 8.8%	1.67 SD 41%

Table 2. Color, Foreign Matter

Species	Color	Foreign Matter
Spider Plant (Saga) <i>Gynandropis gynandra</i>	Dark green with light brown stems	<0.1%
Black Nightshade (Managu) <i>Solanum nigrum</i>	Dark green with light brown stems	<0.1%
Amaranth (Dodo) <i>Amaranthus retroflexus</i>	Dark green with light brown stems	<0.1%
Cowpea Leaves (Kunde) <i>Vigna unguiculata</i>	Light brown to dark brown & dark green	<0.1%



Amaranth



Spider Plant



Nightshade

Table 3. Elemental analysis of select essential nutrients

Species	Ca (g/100g)	Mg (g/100g)	K (g/100g)	Fe (mg/100g)	P (g/100g)	Zn (ppm)	Mn (mg/100g)
Spider Plant (AIV 12059)	1.52	0.43	0.94	58.80	0.94	4.60	9.98
Nightshade (AIV 12061)	1.02	0.31	1.86	35.70	1.86	3.70	8.75
Amaranth (AIV 12070)	2.79	1.23	1.99	32.30	0.41	6.70	15.50
Spinach				35.80		6.00	10.20

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