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POTENTIAL ROLE FOR WILD VEGETABLES IN HOUSEHOLD FOOD SECURITY: A PRELIMINARY CASE STUDY IN KWAZULU-NATAL, SOUTH AFRICA

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ABSTRACT

The value of wild edible vegetables in food security has not been given sufficient attention in South Africa. Consequently, there are no formal interventions that seek to encourage people to use traditional vegetables as sources of essential nutrients. Studies on the role of wild leafy vegetables in food security could provide important information for development of policies on careful exploitation of natural resources for human sustenance. The objective of this study was to provide a rapid assessment of general knowledge about wild leafy vegetables among subsistence farmers from Ezigeni, a rural location in South Africa, and to determine the availability of wild leafy vegetables from cropping fields during spring - before the cropping season started. A focus group discussion and transect walk were used to collect qualitative data on knowledge of traditional vegetables. Availability of wild leafy vegetables was quantified using one-square-meter plots, randomly located in a cropping field and in an area that has never been cultivated (veld). Results showed that knowledge of wild leafy vegetables among the participants was positively correlated with age. Education status improved knowledge of wild vegetables for middle-aged participants, but not for the youth (35 years or younger). Availability of wild edible leafy vegetables (plant numbers and yield) increased from August to October, but there was a significant difference between species. Data from a focus group discussion showed that wild leafy vegetable availability occurred early in spring, when traditional crops were less abundant. It is concluded that knowledge of wild leafy vegetables may be lost in the near future, unless efforts are made to educate younger generations about their importance. They could be used as an important source of nutrients during the pre-cropping season, before traditional crops are available for human consumption. It is recommended that agronomic investigations into cultivation of wild leafy vegetables that are adapted to rural areas where exotic leafy vegetables are not widely available be undertaken. Those studies could contribute significantly in government policies to improve food security in rural areas, and in the improvement of wild vegetable status, whose potential as sources of nutrition is currently undervalued.

Key words: availability, knowledge, wild leafy vegetables

French

RÔLE ÉVENTUEL DES LÉGUMES SAUVAGES DANS LA SÉCURITÉ ALIMENTAIRE DES MÉNAGES : UNE ÉTUDE DE CAS PRÉLIMINAIRE DANS KWAZULU-NATAL, AFRIQUE DU SUD

RÉSUMÉ

La valeur des légumes sauvages comestibles dans la sécurité alimentaire n'a pas bénéficié de suffisamment d'attention en Afrique du sud. C'est pourquoi il n' y a pas d'interventions formelles qui cherchent à encourager les gens à utiliser des légumes traditionnels comme sources de nutriments essentiels. Des études sur le rôle des

légumes sauvages à feuilles dans la sécurité alimentaire pourraient donner d'importantes informations permettant d'élaborer des politiques relatives à une exploitation attentive des ressources naturelles pour l'alimentation humaine. L'objectif de la présente étude était de fournir une évaluation rapide des connaissances générales des légumes sauvages à feuilles chez des agriculteurs de subsistance d'Ezigeni, une région rurale de l'Afrique du sud, et de déterminer la disponibilité des légumes sauvages à feuilles dans les champs de cultures pendant le printemps – avant que la saison culturale commence. Une discussion de groupes et une marche transversale ont été utilisées pour collecter des données qualitatives sur les connaissances des légumes traditionnels. La disponibilité des légumes sauvages à feuilles a été quantifiée en utilisant des parcelles de terrains de 1 mètre carré situés au hasard dans un champ de cultures et dans un endroit qui n'avait jamais été cultivé (veld). Les résultats ont montré que les connaissances des légumes sauvages à feuilles chez les participants étaient positivement en corrélation avec l'âge. Le niveau intellectuel augmentait les connaissances des légumes sauvages chez les participants d'âge moyen, mais pas chez les jeunes (35 ans ou moins). La disponibilité des légumes sauvages à feuilles comestibles (nombres et rendement des plantes) augmentait entre août et octobre, mais il y avait une différence considérable entre les espèces. Les données découlant d'une discussion de groupe ont montré que la disponibilité des légumes sauvages à feuilles se manifestait au début du printemps lorsque les cultures traditionnelles étaient moins abondantes. Il est conclu que les connaissances des légumes sauvages à feuilles peuvent se perdre dans un proche avenir, si des efforts ne sont pas déployés pour éduquer les jeunes générations sur l'importance de ces légumes. Ces derniers pourraient être utilisés comme une importante source de nutriments pendant la saison pré-culturale, avant que les cultures traditionnelles soient disponibles pour la consommation humaine. Il est recommandé que des recherches agronomiques soient axées sur la culture de légumes sauvages à feuilles qui sont adaptés aux milieux ruraux où les légumes sauvages à feuilles ne sont pas répandus. Ces études pourraient contribuer considérablement aux politiques gouvernementales pour améliorer la sécurité alimentaire dans les milieux ruraux; ces études pourraient également contribuer à l'amélioration de l'état des légumes sauvages dont le potentiel en tant que sources de nutrition est actuellement sous-estimé.

Mots-clés: disponibilité, connaissances, légumes sauvages à feuilles

INTRODUCTION

The three major challenges to household food security in South Africa at present are unemployment, HIV/AIDS and poverty [1]. These challenges are interrelated and disproportionately affect rural populations [2]. Health workers often advise people to increase vegetable consumption, but many people cannot afford to buy vegetables or the inputs required to grow them. Whereas the role of wild leafy vegetables in food security is recognised in other African countries, their use in South Africa has

diminished and consumption is associated with poverty and low self-esteem among rural people [3, 4, 5]. However, rural Africans still hold indigenous knowledge about wild vegetables [5]. Wild vegetables grow spontaneously and in abundance around rural homesteads [6], contain valuable nutrients and are palatable at a young stage of plant development [6, 7, 8, 9]. Despite the abundance of wild vegetables and their beneficial nutritional value, no published studies were found to show that rural households and people infected with HIV/AIDS in South Africa make extensive use of this natural resource to improve health and food security. Poor utilisation of wild vegetables may be associated with lack of knowledge about how to access quantities that can satisfy daily human food requirements. Wild vegetables are marginalized in current agricultural research [10]. Modern agricultural systems have succeeded in providing calories, but in the process, they have increased 'hidden hunger' (micronutrient malnutrition) by displacing edible local plants [11].

This study was conducted at Ezigeni location in Umbumbulu, South Africa. The location is a rural area occupied by a Zulu-speaking indigenous African population. It is located about 60 km from the major cities in the province of KwaZulu-Natal, Durban and Pietermaritzburg. Ezigeni is characterised by an average household size of six persons. Subsistence farming begins, depending upon the advent of rains, in spring or summer. Traditional crops (maize, beans, potatoes, pumpkins, taro and groundnuts) are predominant in the Ezigeni agriculture, which is practised on land areas ranging from 0.2 to 2 ha per household, mainly by women-farmers. The major sources of leafy vegetables are the fresh produce retailers or hawkers in the cities or Ispingo, a small town, about 40 km away. Preliminary discussions with community members showed that women occasionally harvest wild leafy vegetables from cultivated lands and from the veld (non-cultivated lands around homesteads), but wild vegetables are generally held in low esteem by younger (and supposedly more modernised) members of the community. This strategy of wild vegetable collection and the view of wild vegetables are typical of rural areas in South Africa. With a view to determine the potential for wild leafy vegetables in food security, this study was designed to permit a rapid assessment of the general knowledge and availability of wild vegetables at Ezigeni location. The specific objectives of the study were to determine:

- The relationship between age and gender with respect to the general knowledge of wild leafy vegetables,
- Which wild leafy vegetables were known and consumed by people from different households, and
- The availability and yield of wild leafy vegetables during the pre-cropping period from August to October 2004.

METHODOLOGY

Description of research subjects

The study was conducted at Ezigeni, a rural community at Umbumbulu, KwaZulu-Natal. Subsistence farmers who were members of a farmers' association called the Ezemvelo Farmers' Organisation were invited to participate in the study and no gender

or age distinction was made. Two men and seventeen women participated in a focus group discussion. The ages of participants ranged from 23 to 76 years. Education levels ranged from no formal education (six members) to tertiary qualification (one member had completed a Junior Secondary Teacher Certificate). Qualitative and quantitative methods were used to collect data.

Qualitative data collection

One focus group discussion, which took place in the form of a workshop, was used to collect qualitative data. Semi-structured, closed and open-ended questions were used during the discussions. A manual was used to derive colour pictures of wild leafy vegetables, which were presented to the participants for identification [12]. Participants were requested to identify the plants by names, and a translation of plant names from Zulu to English was performed using published manuals [9, 12]. The participants were also requested to respond to questions and provide information about availability, harvesting, utilisation and preference for wild leafy vegetables. Stickers of different colours were used on white paper charts to indicate categories of harvesting sites (e.g. cropping land or veld), genders and designations (e.g. mother, grandmother, etc.) of persons according to their roles in harvesting and use of wild leafy vegetables (Figure 1).

To determine the participants' knowledge of wild vegetables, each person was requested to list all the wild vegetables they knew. Each person was allowed three minutes to complete this task, which was performed sequentially. To ensure that an individual's list was not disclosed to others until the end of the exercise, the person listing the vegetables was separated from others. Their lists were recorded on a chart concealed from the view of other participants. Participants who could not write were assisted by a local research assistant from Ezigeni. Each participant also included their age and level of education on the chart.

When the participants had completed the above tasks, they were requested to produce a seasonality chart indicating the availability of wild vegetables throughout the year. Using the information in the seasonality chart, participants were requested to indicate cultural activities associated with crop production, including the period of scarcity and vulnerability to food security. To conclude the discussion, a transect walk was taken across the cropping fields, and other places where edible wild vegetables could be harvested. A map was produced to indicate the places where wild vegetables are commonly found.

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Figure 1. An example of how respondents indicated plant names (e.g. imbati: stinging nettle, umsobo: common nightshade), harvesting and utilisation of wild vegetables by members of the Ezigeni community.

Key: The large black circles represented grandmothers; the small black circles represented mothers; the large grey circles represented grandfathers; the small grey circles represented girls. Note: Details about plant pictures and other categories (men, grandfathers, fathers and boys) are not shown.

Quantitative data collection

To quantify the availability and potential yield of wild leafy vegetables, permission was sought from some of the participating members to use their fallow cropping field (750 square metres) and an adjacent veld (900 square metres). The veld was about 30 metres from the cropping field on the same soil type and slope (facing south-east), just above a stream.

Every first week of the month, from 7 August to 7 October 2004, edible leafy vegetables were identified (consistently with three of the research subject participants and with the use of manuals) and harvested from the two sites. At each sampling, representative samples were collected from 12 plots (six per field and one square

metres per plot) that were randomly located in each field. The one-square meter plots were selected randomly to avoid bias, and to improve chances of reaching different plant species during data collection. The number of plants identified as known edible leafy vegetables were counted and recorded per plot. Sampled plants were taken to the laboratory at the University of KwaZulu-Natal, Pietermaritzburg, where leaf numbers, leaf mass, and leaf area, were determined. The means of these variables were used to estimate the yield (leaf number and leaf mass) and the growth (leaf area) of identified wild vegetables. Published data were used to estimate the nutritional values of raw plant leaves [8].

Statistical analysis

Qualitative data was transformed to produce counts of individuals in each category for wild vegetable harvest, use and preference. The counts were used to calculate percentages for each category. Genstat® statistical package (Rothamsted Experimental Station, UK) was used to perform analysis of variance to determine differences between the cropping field and veld, with respect to quantitative variables (species, plant number, leaf mass, and leaf area). For reasons of conciseness, only selected data on farmer-knowledge and availability of wild vegetables (leaf mass: data on plant numbers and leaf area would be redundant) are presented in this paper.

RESULTS

General availability of wild leafy vegetables

In a normal year, the abundance of wild leafy vegetables and food crops at Ezigeni occurs as depicted in Table 1. Between November and April, wild leafy vegetables are comparable to food crops in abundance (Table 1). However, leafy vegetable availability seems to decline earlier (May) than that of food crops, and the former become scarce by midwinter (June, July) until spring (August), when their growth resumes. The research undertaken in this study showed that wild leafy vegetables were more available, and occurred in greater variety, in the cropping field compared with the veld (Figure 2). Regardless of field type, there was a significant ($P < 0.05$) increase in wild leafy vegetables as the season progressed from August to October. The variety of wild vegetables increased in close association with plant mass per species (Figure 2).

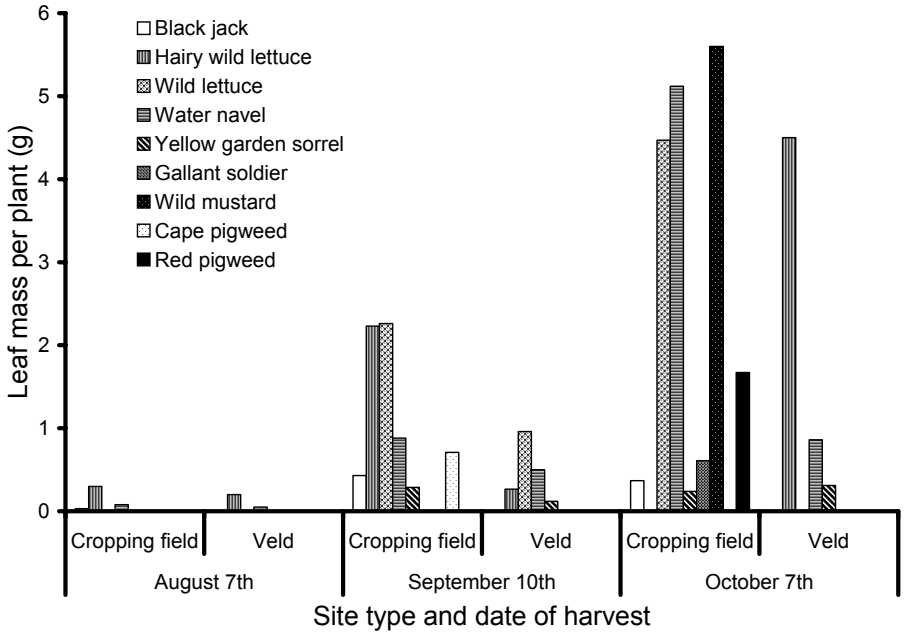

Figure 2. Comparison of a fallow cropping field and a veld for availability of wild leafy vegetables during the pre-cropping period (August to October) at Umbumbulu.

Knowledge of wild leafy vegetables

During the three-minute assessment of knowledge about wild leafy vegetables, it was found that the farmers could be categorised into three groups, with respect to the ability to recall known wild leafy vegetables. These groups were:

1) People aged 54 years or younger (range: 54 - 23) with zero to six years of successfully completed formal education recalled an average of five plants per person (range: 8 - 0) (69% of respondents).
2) People with ages falling in the same range as in 1) above, with 11 to 13 years of successfully completed formal education recalled an average of seven plants per person (range: 9 – 6) (18% of respondents).
3) People older than 70 years of age (range: 77 - 74) recalled nine plants per person (range: 0) (13% of respondents).

Amaranthus (*Amaranthus thunbergii* and *A. hybridus*), black jack (*Bidens pilosa*) and gallant soldier (*Galinsoga parviflora*) were recalled by all of the farmers and reported to be the popular wild vegetables at Ezigeni. Women were found to play a major role in the collection and preparation of wild leafy vegetables, whereas men and youth generally did not harvest or prepare wild vegetables. Men reportedly enjoyed eating

wild vegetables, but liked wild vegetables less compared to grandmothers, mothers, female youth and children (Figure 1).

Nutritional value of wild leafy vegetables

Nutritional evaluation showed that the wild vegetables identified in this study are more nutritious than the popular exotic vegetables among the African population in South Africa, i.e., cabbage and swiss chard [8]. It was found that among the wild vegetables, amaranthus, black jack, and water navel are more valuable sources of vitamins C, vitamins A and E, and iron and zinc, respectively, compared with cabbage and swiss chard (data not shown).

DISCUSSION

The relatively prolonged availability of traditional crops compared with wild leafy vegetables at Ezigeni (Table 1) may be associated with a long harvestable stage of taro and long term storage of both taro and maize grain. The farmers from Ezigeni indicated no availability of exotic leafy vegetables, an indication that wild leafy vegetables may be the major source of micronutrients for the majority of resource-poor people at Ezigeni. Potatoes, sweet potatoes and taro were the major types of vegetables described by the farmers. All these vegetables are major sources of starch and provide limited amounts of micronutrients [8]. It was of interest to note that the scarcity of food crops generally coincided with the time of the year when wild leafy vegetables were becoming more abundant, i.e., end of August to October (Table 1).

The abundance of wild leafy vegetables as recited by the farmers was confirmed in this study, because the increase in wild leafy vegetables in both the cropping field and the veld were correlated with the increase cited in Table 1. Clearly, cultivated lands are more suitable for growth and development of wild leafy vegetables, an indication that their availability could be enhanced by cultural practices associated with crop management. Hence, wild leafy vegetables may be amenable to domestication, and for many people they are potential crops that currently exist as weeds of conventional crops.

It is granted that the above data on how the farmers recalled known wild leafy vegetables in a three-minute assessment were derived from a population sample too small to allow adequate assessment of the farmers' knowledge of wild vegetables. However, the data suggested that the younger generation might have less knowledge of wild vegetables than older members of the community. Education may have an important role in improving wild vegetable knowledge among subsistence farmers. Further investigation into the subsistence farmers' knowledge of wild vegetables is required to explain whether or not the trend found in this study can be statistically confirmed.

CONCLUSIONS

This study showed that wild vegetables could contribute significantly to the dietary requirements of rural households at Ezigeni. It is possible that a square metre of cultivated land could provide enough nutrients for a household in the first week of October. Even during August and September, the contribution of wild vegetables to household nutrient requirements could be improved by increasing the total area used for collection, and by selecting the more nutritious species. Since wild vegetables are generally more nutritious than cabbage and swiss chard, these two sources of essential nutrients should be used together, even during the periods of relative abundance of conventional vegetables. Comparison of data presented in Table 1 and Figure 2, about the relative availability of wild leafy vegetables and crops, suggests that wild leafy vegetables can be used as important sources of micronutrients to supplement traditional staple diets, which are largely based on starchy foods. It is recommended that agronomic investigations into cultivation of wild leafy vegetables adapted to the rural areas where exotic leafy vegetables are not widely available be undertaken. Those studies could contribute significantly in government policies to improve food security in rural areas and in the improvement of wild vegetable status, whose potential as sources of nutrients is currently undervalued.

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Table 1. General availability of wild edible leafy vegetables and crops during the different months of the year at Ezigeni, as indicated by subsistence farmers.

Month	Availability of wild leafy vegetables	Description of availability of wild leafy vegetables	Availability of crops as food	Crop production activity
January	✔ ✔ ✔	Abundant throughout the month	✔ ✔ ✔	Consumption and sale of vegetable produce. Early planted green mealies* is consumed. Late planted summer beans are harvested.
February	✔ ✔ ✔	Abundant throughout the month	✔ ✔ ✔	Consumption of vegetables and planting of beans. More green mealies is consumed.
March	✔ ✔ ✔	Abundant throughout the month	✔ ✔ ✔	Consumption of vegetables and planting of beans and potatoes. Green mealies is still available.
April	✔ ✔	Abundance decreases toward the month's end. Most species have flowered.	✔ ✔ ✔	Consumption of vegetables and planting of beans. Late planted green mealies is available. Start harvesting taro.
May	✔	Moderately available throughout the month. Some species are not available. Most species have seeds.	✔ ✔	Start harvesting the early planted maize grain. Taro harvesting continues.
June	x	Most species are not available.	✔	Finish harvesting maize grain.
July	x	Generally, garden species are not available. Only a few veld types are available.	✔	Release cattle into the cropping fields to feed on maize stalks and to drop dung and urine. Taro harvesting continues.
August	x ✔	Same as July, but early rains could make more species available as young seedlings towards the end of the month, but they flower too early.	✔	Cropping fields lie fallow. Early spring rains come. Late taro crop is harvested or taro planting material starts emerging.
September	✔ ✔	Most garden species are available as young seedlings and veld species are available as old, less palatable plants.	x	More spring rains. Land preparation (ploughing) starts, followed by planting of beans and vegetables (potatoes, sweet potatoes and taro).
October	✔ ✔ ✔	Abundant throughout the month	x ✔	More rain. Planting of maize and most other crops.
November	✔ ✔ ✔	Abundant throughout the month	✔ ✔	Crop cultivation (hand-hoeing) for maize and other crops. Harvesting of early bean crop.
December	✔ ✔ ✔	Abundant throughout the month	✔ ✔ ✔	Harvesting of early potato crop, early green mealies and late planted spring beans.

Symbols were selected to indicate the presence (✔) or absence (**x**). The variation in presence was indicated with (✔) to show low availability, (✔ ✔) to show moderate availability and (✔ ✔ ✔) to show abundance. * Green mealies = fresh maize served after boiling on the cob.

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