The role of edible weeds as food amidst an herbicide revolution in Zambia

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Abstract

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Concern continues to grow for global food security as rates of hunger and malnutrition are on the rise. African leafy vegetables and wild edible plants have been well-documented as important contributors to diets amid times of scarcity, however little attention has been given to these plants in the context of agricultural weeds. This distinction is important as herbicides are on the rise across developing nations and it is important to assess the trade-offs that come with them. The aim of this study was to assess the importance of edible weeds for food security and how they are affected by growing rates of herbicide adoption. Research was conducted in the Eastern and Southern Provinces of Zambia. Quantitative interviews were conducted with 159 households along with field walks to collect data on the types of weeds consumed, household consumption patterns and herbicide adoption rates. The relevance of edible weeds for food is evident, especially during periods of heightened food insecurity. They are however, more than famine foods. Edible weeds were consumed regardless of socio-economic characteristics indicating their importance in food culture. Moreover, edible weeds were often used additionally for fodder, medicine and nutrition. Herbicide usage was low, however, households demonstrated a high interest in adoption. While no correlation was found between herbicides and edible weed consumption, this will likely change in the future as herbicide adoption rates are expected to increase. Further promotion and training in agrochemicals should take into account the associated risk to edible weeds as a pertinent food group to smallholder farmers.

Summary

Introduction/Background

Concern continues to grow for global food security as rates of hunger and malnutrition are on the rise. African leafy vegetables and wild edible plants have been well-documented as important contributors to diets amid times of scarcity, however little attention has been given to these plants in the context of agricultural weeds. This distinction is important as herbicides are on the rise across developing nations. Herbicide usage may provide benefits to increasing food security by increasing yields, however they may also come with unintended consequences to human and environmental health. Furthermore, they may adversely affect the contribution of edible weeds as a food source. As herbicide use is expected to continue grow, it is important to assess the trade-offs that come with them.

Objectives/Research Questions

The objective of the study was to provide an understanding of if, and how edible weeds contribute to household food security for small-holder farmers in Zambia and, in relation to edible weeds, how herbicide usage may, in turn, affect food security. In order to meet the objective, the following research questions were used:

1. Which edible weeds are used by smallholder farming households?
2. How relevant are edible weds for household food security?
3. What are the trends in herbicide adoption amongst smallholder farmers?
4. How are these trends affecting edible weed consumption?

Methods

The study was conducted in the Eastern and Southern Provinces of Zambia. Quantitative interviews were conducted with 159 randomly selected households. The head of the household along with the person responsible for food were interviewed on the topics of household demographics, farm description, pesticide usage, edible weed usage, food security and knowledge and perception of herbicides, nutrition and edible weeds. In addition to interviews, 14 guided field walks were carried out in order to collect and identify the edible weeds described in the interviews.

Results

Edible weeds were consumed by all of the households within the study. A total of 22 edible weeds were identified (2 to their genera and 20 to their species). The most prominent weeds used by households include *Amarathus* sp., *Cochorus olitorius*, *Bidens* sp., *Ceratotheca triloba* and *Cleome gynandra*. Edible weeds were seldom used only for food and were used additionally as fodder by 81% of households, medicine by 46% of households and income by 11% of households. Households consumed edible weeds regardless of socio-economic factors (age, gender, income and education) but were consumed significantly more frequently by households in the Southern Province than in the Eastern Province (r=-0.4, p=<0.001).

Edible weeds were consumed primarily as a means to supplement their diets (54%, n=157) but were also almost equally consumed out of tradition (53%) and preference (46%). Edible weeds were preserved by 137 households, from which 99% did so to ensure food security for the future. The peak times for edible weed collection also coincide the with periods of times in which households expressed being food insecure. Furthermore 87% of total number of respondents (n=270) perceived edible weeds to be especially important during times of food scarcity.

Herbicides were used by 34% of households primarily as a means to effectively manage weeds and to save labor. Edible weeds were still collected from sprayed fields. Moreover, the times of peak herbicide application overlap with the times in which edible weeds are the most frequently collected by households. However, no correlation between herbicide usage and edible weed consumption was discovered.

Over half of the respondents began using herbicides within a two year prior to the study (since 2017) and 91% had started within the previous 5 years (since 2014). Over 60% of households described wanting to adopt herbicides or adopt more herbicides. The primary constraint in adoption was due to financial reasons followed by a lack of knowledge. 24% of respondents described being unsure if herbicides are potentially harmful or not (n=270). Although 89% of respondents believed it was necessary to wear protection when using herbicides, safety procedures were not well followed.

Discussion

The study illustrates the importance of edible weeds as food, especially in times of heightened for insecurity. Many of the edible weeds identified are well-known across Africa as traditional leafy vegetables. Higher consumption rates in the Southern Province than in the Eastern Province may be indicative of cultural or climatic differences relating to food security. Consumption patterns as well as the overlapping timeframe of peak edible weed consumption and peak food insecurity demonstrate the importance of edible weeds for food security. The high nutritional content of edible weeds makes them especially important for nutrition, dietary ailments and as fodder. Edible weeds are, however, more than famine foods.

Herbicide adoption rates are low, but higher than anticipated. The benefits of herbicides may result in reduced labor equating to reduced cost and more time. However, the loss of work opportunities arising from reduced labor may also widen inequality and increased food insecurity for some. Additionally, the benefits of herbicide usage are dependent on proper implementation. The lack of regulation of herbicide products, and the limited knowledgeability of farmers on safety and application procedures reveal major problems for future herbicide usage. Although no correlation was found between herbicides and edible weeds, application patterns and growing adoption rates of herbicides indicate that this will likely change in the future.

Conclusion

The relevance of edible weeds in the diets of Zambians is evident, especially during periods of heightened food insecurity. Moreover, edible weeds are often used additionally for fodder, medicine and nutrition. While no correlation was found between herbicides and edible weed consumption, trends indicate that this will likely change in the future with higher adoption rates of herbicides. Furthermore, current regulations and training for farmers in pesticide use is inadequate and, if left as is, will likely result in a number of environmental and health complications with the cost of edible weeds as a food source. Further promotion and training in agrochemicals should take into account the associated risk to edible weeds as a pertinent food source to smallholder farmers.