**Constraints to the production of *Senecio biafrae* (Worowo) in Southwestern Ekiti State, Nigeria**

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**ABSTRACT**— The study assessed the constraints to the production of *Senecio biafrae* (Worowo) in Ekiti State, Southwestern Nigeria. A structured interview schedule was used to obtain information from 120 respondents. Data collected were analyzed using frequency counts and percentages and mean score. The majority (71.6%) of the respondents was male and greater proportion (35.0%) was above 60 years of age. The majority (74.0%) were married while a greater proportion (30.1%) had secondary education. For the family size, 38.0% had between 4-6 persons while the major occupation of 64.2% of the respondents was farming. However, only 7.3% of these farmers had extension contact in the last one year. On the production characteristics of *Senecio biafrae*, 59.3% indicated it was difficult finding the crop and hence the majority (22.8%) indicated they harvested once in every two weeks and 37.4% indicated the total bunches harvest in the last farming season was ≤2. On the sources of information on *Senecio biafrae*, the majority (79.7%) of the respondents indicated they sourced information from family members and their major constraint to cultivation and utilization of *Senecio biafrae* was poor availability of planting materials. However, the perceived strategy for large scale production and utilization of *Senecio biafrae* as indicated by the respondents was irrigation (35.0%). *Senecio biafrae* is an endangered crop species and the major sources of information were not research- based. This has led to poor availability of planting material, sustainable production and utilization of the crop. Hence, there is need for synergy among farmers, extension agents and research institutes for proper domestication and production of *Senecio biafrae*. Farmers should be encouraged also to plant *Senecio biafrae* in homegardens, around streams and other sources of water as irrigation has been found to be key among other factors for all-year-round sustainable production and utilization of *Senecio biafrae*.

**KEYWORDS:** Constraints to production, Senecio biafrae, worowo, under-utilized, neglected, leafy vegetable

**1. INTRODUCTION**

Protein-energy malnutrition has been a major global challenge of various nations for several decades, but worse nutritional challenge currently facing the rich, elite and the resource-poor is the micronutrient malnutrition. [1], [2] noted that more than half of the global human population is deficient in Zn and Fe; this has been a major public health concern for mankind. Majority of these micronutrient deficient people are especially located in developing countries where a proportion of the population eat unbalanced diets and cannot afford food supplements that could make up for the deficient minerals and vitamins in meals. Poor and unbalanced nutrition have led to a number of chronic health challenges, respiratory disorders, diabetes, obesity and cardiovascular diseases [3]. Fruit and green leafy vegetables especially the lesser-known, and the neglected and underutilized leafy vegetables reputed for nutrient-density and nutraceutical benefits have significant roles to play in combating micronutrient deficiency challenges and contribute to both food and nutrition security. Neglected and underutilized plant species are currently being explored for their food and medicinal potentials [4].

Tropical rainforest and derived savanna belts of Nigeria are especially known for huge biodiversity of edible but lesser-known and wild vegetables. Large proportion of these wild and lesser-known vegetables just grow on their own in the wild without any domestication, conservation, crop management or crop improvement. Some of their accessions (genotypes) are currently being wiped off in the natural environments where they exist by the adverse effects of climate change and huge deforestation currently on-going in these agro-ecologies.

*Senecio biafrae* is one of these important lesser-known green leafy vegetables that are mostly harvested in the forests and in the plantation of permanent crops such as coffee and cocoa. In Southwestern Nigeria and especially Ekiti State, *Senecio biafrae* is the most cherished, costliest and most scarce green leafy vegetable in the markets. It is commonly called “worowo” or “rorowo”. In Ekiti State of Nigeria, this green leafy vegetable is a major soup ingredient specially cherished by the aged and as well as young men and women. It is believed to have many health benefits. Information on its domestication, production, nutraceutical potentials, utilization, conservation and the level of extension work involved in the transfer of technologies about the crop are scanty in the literature. This study was therefore initiated to examine the constraints to the production and utilization of *Senecio biafrae.* Specially, the study sought to describe the socio-economic characteristics of the respondents, level of extension agents’ involvement in the production of the vegetable and the income generated from the sales of this vegetable by the farmers in Ekiti State Nigeria.

**2. MATERIALS AND METHODS**

***2.1 Study Area***

The study was carried out in Ekiti State, Nigeria. Ekiti State is one of the major *Senecio biafrae* (worowo) producing areas in South Western Nigeria. Ekiti State has 16 Local Government Area and a total population of 2, 398, 957 people consisting of 1,215, 487 males and 1, 183, 470 females [5], [6].

***2.2 Sampling Techniques***

The population used for the study comprised of *Senecio biafrae* farmers in the study area. The multistage sampling technique was employed for the study in selecting respondents. In the first stage the three Agricultural Zones (Zones 1, 2 and 3) in the State were selected. In the second stage, two blocks were randomly selected in each of the agricultural zones. In the third stage, two circles were randomly selected in each of the blocks. In the fourth stage ten *Senecio biafrae* farmers were selected using simple random sampling technique. In all, that gave a total of 120 *Senecio biafrae* farmers used for the study.

**Table 1:** Sampling frame

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **S/N** | **Agricultural Zone** | **Block** | **Circles** | **Number of Respondent** |
| 1. | Zone 1 | Ado | Ado-Ekiti metropolis and Ago | 20 |
| Ijero | Iroko and Okeoro | 20 |
| 2. | Zone 2 | Ikere | Ikere metropolis and Afao road | 20 |
| Ise | Ise and Temidire | 20 |
| 3. | Zone 3 | Ikole | Ayedun and Odo-oro | 20 |
| Oye | Oye and Ayegbaju | 20 |

***Measurement of variables***

The socio-economic characteristics of the respondents were measured as follows:

Sex: The respondents were asked to indicate whether they were male or female.

Age: The respondents were asked to indicate their ages in years.

Marital status: the marital status was ascertained by asking them to tick whether they were ‘single’, ‘married’ ‘separated’ or ‘widowed’.

Education levels: Respondents were asked to indicate their level of education by ticking any of the following: ‘no formal education’ ‘primary education’, ‘post primary education’, etc as it affects them.

Family size: The family size of the respondents was known by asking the respondents to indicate the actual numbers of their households.

Major occupation: the major occupation of the respondents was ascertained by asking the respondents to indicate whether they were into ‘farming’ ‘trading’, ‘civil/public service’, and ‘artisan’ etc.

Extension visit: the respondents were asked to indicate if they had contact with extension agents by ticking either ‘yes’ or ‘no’. If yes, they were asked to indicate the number of extension visits in a year.

For the production characteristics of *Senecio biafrae*, the respondents were asked to indicate how difficult it was to find the crop by either ticking ‘yes’ of ‘no’. On the frequency of harvest from source, the respondents were asked to indicate how often they harvested *Senecio biafrae* using the following options of ‘twice a week’, ‘weekly’, ‘once in two weeks’, and ‘once every four months’. The respondents were equally asked to indicate the total quantity (bunches) of *Senecio biafrae* harvested in the last farming season. This was later categorized into ≤2 bunches, 3-5 bunches and >5 bunches.

On the sources of information on *Senecio biafrae,* the respondents were asked to indicate from a list provided the sources of information used. They were equally asked to indicate other sources they use in sourcing information that were not on the list. The constraints to cultivation and utilization of *Senecio biafrae* were equally ascertained by asking the respondents to indicate the constraints encountered. Similarly, the strategies for large scale production and utilization of *Senecio biafrae* were equally ascertained by asking the respondents to indicate the perceived strategies.

***2.3 Data analysis***

Data were collected from Senecio biafrae farmers using the structured interview schedule. The interview schedule administered to the Senecio biafrae farmers had relevant questions based on the objectives of the investigation. Data collected were analyzed using frequency, percentage and mean scores. IBM SPSS Statistics 20 was used for the data analysis..

**3. RESULTS AND DISCUSSION**

***3.1 Socio-economic characteristics of the respondents***

Sex

Table 1 shows that the majority (71.6%) of the respondents were males while 28.5% were females. This implies a male dominated workforce as farming activity is basically a tedious work that demands a lot energy that are associated with men.

Age

Greater proportion (35.0%) was above 60 years of age while 24.4% were between 51-60 years. Also, 17.1% was between 31-40 years while 14.6% and 8.9% were between 41-50 years and less than or equal to 30 years, respectively. This implies that most of the respondents were a little bit advanced in age and this could be because *Senecio biafrae* perhaps were mostly known by older farmers than the younger farmers.

Marital status

The majority (74.0%) of the respondents were married (Table 1) while 13.0% and 12.2 % were separated and single respectively. This implies that greater percentage of the farmers were married and are likely to produce and consume *Senecio biafrae* more probably because of nutritional and medicinal attributes peculiar to the crop.

Educational level

Table 1 shows that a greater proportion (30.1%) of the respondents had secondary education while 25.2%, 22.8% and 22.0% had primary education, no formal education and post secondary education respectively. This shows a high level of formal education among the respondents in the study area and this could have a positive influence in farmers accessing information on *Senecio biafrae*. [7] asserted that literacy and acquisition of formal education could enhance farmers’ level of understanding and desirability of adopting new farm technologies or relating in a good way with the extension agents.

Family size

The majority (38.0%) of the respondents had a family size of between 4-6 persons while 20.3% did not specify their family size. However, 16.3%, 14.6% and 10.6% had 7-9 persons, 1-3 persons and 10 and above persons, respectively. The mean family size was 2 persons. This indicates a low family size which could deprive family labour for *Senecio biafrae* production. [8] revealed that large household size could contribute to labour availability in crop production.

Major occupation

The majority (64.2%) of the respondents were farmers while 14.6%, 13.8% and 10.6% were artisans, traders and students, respectively. The result indicated a possible high level of experience among the respondents which could likely increase their production capacity of *Senecio biafrae*.

Extension Visit

Table 1 shows that only 7.3% of the respondents had contact with extension agent. On the number of visits in the last farming season, 77.8% was visited once while 11.10% each were visited twice and three times respectively. This implies a poor extension service delivery threaded the traditional extension role of providing information to farmers. As a result, farmers might be uninformed on sustainable production and utilization of *Senecio biafrae.* [9] asserted that farmers with robust access to extension services had capacities to understand technical and agricultural information about crop production technologies.

**Table 1:** Socio-economic characteristics of the respondents

|  |  |  |  |
| --- | --- | --- | --- |
| **Socio economic characteristics** | **Frequency** | **Percentage**  | **Mean** |
| **Sex** |  |  |  |
| Male | 88 | 71.6 |  |
| Female | 35 | 28.5 |  |
| **Age (years)** |  |  |  |
| ≤30 | 11 | 8.9 |  |
| 31-40 | 21 | 17.1 |  |
| 41-50 | 18 | 14.6 |  |
| 51-60 | 30 | 24.4 |  |
| >60 | 43 | 35.0 |  |
| **Marital status** |  |  |  |
| Single | 15 | 12.2 |  |
| Married | 91 | 74.0 |  |
| Divorced  | 3 | 0.8 |  |
| Separated  | 16 | 13.0 |  |
| **Educational status**  |  |  |  |
| No formal education | 28 | 22.8 |  |
| Primary education | 31 | 25.2 |  |
| Secondary education | 37 | 30.1 |  |
| Post secondary education | 27 | 22.0 |  |
| **Family size** |  |  |  |
| Not specified | 25 | 20.3 |  |
| 1-3 | 18 | 14.6 |  |
| 4-6 | 47 | 38.2 |  |
| 7-9 | 20 | 16.3 | 2 Persons |
| 10 and above | 13 | 10.6 |  |
| **Major occupation** |  |  |  |
| Farming | 79 | 64.2 |  |
| Civil service | 8 | 6.5 |  |
| Artisan | 18 | 14.6 |  |
| Trading | 20 | 13.8 |  |
| Student | 13 | 10.6 |  |
| **Extension contact** | 9 | 7.3 |  |
| **No of extension contact in the last farming season**  |  |  |  |
| Once | 7 | 77.8 | 0.4 |
| Two time | 1 | 11.1 |  |
| Three times | 1 | 11.1 |  |

***3.2 Production characteristics of Senecio biafrae***

The majority (59.0%) of the respondents (Table 2) indicated that *Senecio biafrae* was difficult to find. This could be because the crop is an endangered species and little or no efforts have been made for its domestication and inclusion into the traditional cropping systems, the nutritional and medicinal values notwithstanding.

Frequency of harvest from source

A greater proportion (35.0%) indicated they harvest the crop once every four months (Table 2) while 22.8%, 20.3% and 12.2% indicated they harvest the crop once in a week, weekly and twice a week respectively. This could be because of subsistence nature of production of the crop, poor yield and poor domestication and production practices.

Total quantity harvested in the last farming season (bunches)

Greater proportion (37.4%) of the respondents indicated they harvested less than or equal to two bunches of *Senecio biafrae* in the last farming season while 6.5% and 4.0% indicated they harvested more than 5 and 3-5 bunches respectively. This indicates a poor yield and could stem from poor domestication and poor production practices.

**Table 2:** Production characteristics of *Senecio biafrae*

|  |  |  |
| --- | --- | --- |
| **Production characteristics of *Senecio biafrae*** | **Frequency**  | **Percentage**  |
| **Difficulty in finding *Senecio biafrae*** |  |  |
| Yes | 73 | 59.3 |
| **Frequency of harvest from source** |  |  |
| Twice a week | 15 | 12.2 |
| Weekly | 25 | 20.3 |
| Once in two weeks | 28 | 22.8 |
| Once every four months | 43 | 35.0 |
| **Total quantity harvested in the last farming season (bunches)** |  |  |
| ≤2 | 46 | 37.4 |
| 3-5 | 5 | 4.0 |
| >5 | 8 | 6.5 |

***3.3 Sources of information on Senecio biafrae (Worowo)***

Figure 1 indicates that the majority (79.7%) of the of the respondents sourced information on *Senecio biafrae* from family members while 21.1% sourced from other farmers. Similarly, 3.3% each of the respondents indicated extension agents and internet as sources of information on *Senecio biafrae* production respectively. The respondents’ reliance on family members and other farmers as sources of information on *Senecio biafrae* could be because these information sources could be faster, affordable, available and accessible and are disseminated orally in the local languages the farmers could easily understand. Also, these sources of information though non-institutional, could be relied on based on perceived farming experience and their relationship with the respondents. However, reliance on these information sources could lead to error in the sustainable production and utilization of *Senecio biafrae* because such information might not be scientific and research-based. This could result to poor yield and low productivity that could lead unsustainable production and utilization of *Senecio biafrae*. On the contrary, the poor extension support to the respondents on *Senecio biafrae* indicates that farmers lack scientific-based information on *Senecio biafrae*. As a formal institution, the role of extension agents in supporting farmers at subsistent level in making informed decision necessary for household food security is paramount [10]. When these supports are lacking, farmers can quickly depend on available non-institutional sources as alternatives. It can equally results to farmer sticking to their subsistence and traditional methods of production and utilization of *Senecio biafrae* which has perhaps low potentials for high yield and improved nutrition and standard of living.



**Figure 1:** Sources of information on *Senecio biafrae* (Worowo)

***3.4 Constraints to cultivation and utilization of Senecio biafrae (Worowo)***

Table 3 shows that the majority (24.5%) of the respondents indicated that poor availability of planting materials were the major constraint to production and utilization of *Senecio biafrae*. Similarly, low awareness on nutritional values (19.5%), low yield (18.7%) and lack of finance (15.4%) were also indicated by the farmers as other constraints to *Senecio biafrae* cultivation and utilization. Sustainability of any crop production is a function of seed availability. When seeds are readily available, farmers are likely to produce *Senecio biafrae* provided the nutritional and economic values are known and the finance needed for the production of the crops are available. The crop can also be cultivated and utilized if the farmers are motivated through high yield of the crop. In developing countries however, one the major challenges to agricultural productivity is poor availability of improved variety of seeds among others [11].

**Table 3:** Constraints to the cultivation and utilization of *Senecio biafrae* (Worowo)

|  |  |  |
| --- | --- | --- |
| **Constraints**  | **Frequency** | **Percentage** |
| Poor availability of planting materials | 30 | 24.4 |
| Low awareness on nutritional values  | 24 | 19.5 |
| Low yield | 23 | 18.7 |
| Lack of finance | 19 | 15.4 |
| High cost of labour | 12 | 9.8 |
| Aging of farmers | 12 | 9.8 |
| Post-harvest diseases | 5 | 4.1 |
| Low market demand | 3 | 2.4 |

***3.5 Perceived strategies for large scale production and utilization of Senecio biafrae (Worowo)***

A greater proportion (35.0%) of the respondents indicated that the major perceived strategy for large scale production and utilization of *Senecio biafrae* was irrigation. Also, 9.8%, 6.5% and 5.7% indicated that planting continuously, shading and swamp planting were other perceived strategies for large scale production of *Senecio biafrae.* Similarly, appropriate good cultivation (4.9%), intercropping (4.9%), staking (4.1%), and fertilizer application (4.1%) among others (Table 4) were other perceived strategies as indicated by the respondents for large scale production and utilization of *Senecio biafrae.* Due to non-availability of the seeds (as a major constraint in Table 3), irrigation could be a good strategy for enhancing a sustainable large scale production of *Senecio biafrae* and this could ensure continuous production and all-year-round production. Alternatively, swamp production will make water readily available, hence the cost of irrigation and labour could be cut down. Good cultivation that could include fertilizer application, not uprooting while harvesting, intercropping and staking are possible strategies that could lead to large scale production of *Senecio biafrae.* All things being equal, proper agronomic practices could lead to good yield, profit, proper nutrition and improved standard of living of the farmers.

**Table 4:** Perceived strategies for large scale production and utilization of Senecio biafrae (Worowo)

|  |  |  |
| --- | --- | --- |
| **Perceived strategies for large scale production and utilization of *Senecio biafre*(worowo)** | **Frequency**  | **Percentage (%)**  |
| Planting continuously | 12 | 9.8 |
| Shading | 7 | 5.7 |
| Irrigation | 43 | 35.0 |
| Stem or seed propagation | 4 | 3.3 |
| Staking | 5 | 4.1 |
| Appropriate/good cultivation | 6 | 4.9 |
| No uprooting while harvesting | 3 | 2.4 |
| Intercropping | 6 | 4.9 |
| Swamp planting | 8 | 6.5 |
| Fertilizer application | 5 | 4.1 |
| Financial aid | 4 | 3.3 |

**4. CONCLUSION AND RECOMMENDATION**

In conclusion, *Senecio biafrae* is an endangered crop hence the difficulty experienced in finding the crop. The major sources of information on *Senecio biafrae* to the respondents were not research-based and as a result, the respondents may not be guided properly in the cultivation of the crop. Poor availability of *Senecio biafrae* planting materials could be because the crop is going into extinction, the nutrition and economic values notwithstanding. However to reverse the trend and ensure all-year-round availability, the respondents’ perceived strategies for large scale production and utilization of *Senecio biafrae* was through irrigation. Farmers should therefore collaborate with extension agents and research institutes for research based information that can help in domestication of *Senecio biafrae.* The domestication and inclusion of the crop in the traditional cropping systems can make the planting materials of *Senecio biafrae* available for all-year-round cultivation by farmers. For a sustainable all-year-round production, extension agents should encourage farmers to cultivate *Senecio biafrae* in homegardens around homes, streams, and sources of water for easy irrigation.

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