**Farmers’ selection criteria for sweet potato varieties in Benin: an application of best-worst scaling**

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**Table S1:** Justifications for criteria used to guide the selection of sweet potato variety

|  |  |
| --- | --- |
| Attribute | Justification |
| High root yield | Farmers prefer varieties that yield a large number of roots per plant or per unit area, as this leads to a plentiful harvest, increased earnings, and improved food security. |
| Root Firmness | Sweet potato varieties with firm and sturdy roots that are not easily bruised and have a solid texture when touched or squeezed are preferred by farmers. These varieties are easier to peel, store, and transport, and they also have a superior taste. |
| Root size | Sweet potatoes come in a range of sizes, from small to medium to large. Farmers tend to prefer larger or medium-sized roots because they are more visually appealing and can be sold for a higher price. |
| Root shape | Sweet potatoes come in a variety of shapes, including elongated, oval, and round. Preferences for shape may vary depending on the intended culinary or processing use. Smooth and even roots are generally preferred for their visual appeal and higher market value. |
| Root shelf life | Varieties with long-lasting roots are preferred by farmers to minimize waste and maximize earnings during periods of high demand. Good shelf life is often associated with the firmness of the variety. |
| Sweetness | The sweetness of a sweet potato variety can influence its demand in the market. According to a majority of farmers interviewed in Benin, moderate sweetness is preferred. |
| Fiber content | Refers to the filaments (cellulose). The more a variety tends to easily produce this cellulose during root development, the less it will be appreciated. For farmers, this affects consumption and makes digestion difficult. |
| High vine yield | Varieties that produce a large number of vines are valuable to farmers as they can be used as animal feed or sold as planting material, providing an additional source of income. |
| Early maturing | Farmers prefer sweet potato varieties that mature quickly because they can help avoid issues related to weather or pests. Early maturing varieties can also increase profits by allowing farmers to sell their crops earlier |
| Insect tolerance | In Benin, farmers prefer sweet potato varieties that are tolerant to insects, particularly weevils. Varieties that resist weevils well can produce better root yields with good quality. |
| Disease tolerance | Farmers prefer sweet potato varieties that have better resistance to stunt disease because these varieties can improve overall root yield. |
| Waterlogging tolerance | Varieties that can produce good yields even under wet or flooded conditions are favored by farmers in lowland areas |
| Marketing | The market demand for sweet potato varieties is generally determined by the enthusiasm of consumers, such as households and street vendors, as well as farmers. Factors that affect this demand include root size, shape, color, taste, and shelf life. |

**Table S2**: Socio-economic profile of the sweet potato farmers samples studied

|  |  |  |  |
| --- | --- | --- | --- |
| Variables | Description and Measurement | Mean (standard deviation) | Absolute value (percentage) |
| Number of Respondents  | Total number of individuals in the study |  | 480 (100) |
| *Gender* | Gender of the respondents | - |  |
| Men |  | *-* | 427 (88.9) |
| Women |  | *-* | 53 (11.0) |
| Age | Age of the respondents (in years) | 43.17 (13.09) |  |
| 18-29 |  |  | 59 (12.3) |
| 30\_49 |  |  | 276 (57.5) |
| >=50 |  |  | 145 (30.2) |
| *Education level* | Highest education level (school level) |  |  |
| None |  |  | 249 (51.9) |
| Alphabetized  |  |  | 47 (9.8) |
| Primary |  |  | 132 (27.5) |
| Secondary |  |  | 52 (10.8) |
| *Household size* | Number of individuals in household (actual number) | 8.61 (5.94) |  |
| 0-4 |  |  | 84 (17.5) |
| 5-9 |  |  | 254 (52.9) |
| >9 |  |  | 142 (29.6) |
| *Farming experience* | Years of farming experience (number of years) | 21.63 (11.78) |  |
| 1-10 |  |  | 92 (19.2) |
| 11-20 |  |  | 167 (34.8) |
| >20 |  |  | 221 (46.0) |
| *Previous year’s sweet potato area size(ha)* | Area used for sweet potato cultivation (in hectare) | 0.39 (0.37) |  |
| ≤0.25 |  |  | 252 (52.5) |
| 0.26-0.5 |  |  | 142 (29.6) |
| >0.5 |  |  | 86 (17.9) |
| *Number of sweet potato varieties produced*  | Number of sweet potato varieties produced (actual number) | 1.24 (0.5) |  |
| 1 |  |  | 383 (79.8) |
| 2 |  |  | 82 (17.1) |
| >2 |  |  | 15 (3.1) |
| *Previous year’s sweet potato income* | Income from sweet potato cultivation (in f CFA) | 214.10 (368.19) |  |
| 0-50$ |  |  | 139 (28.9) |
| 51-150$ |  |  | 144 (30.0) |
| >150$ |  |  | 197 (41.0) |

**Education level**: represents the highest level of education completed by the respondents (school level). **Household size**: represents the number of individuals living in the same household as the respondent (actual number). **Farming experience**: represents the number of years the respondent has been engaged in farming activities with their parents, including time spent working with their parents (number of year). **Previous year’s sweet potato area size(ha)**: represents the size of the area used for sweet potato cultivation by the respondent in the previous year (in hectare). **Number of sweet potato varieties produced**: represents the number of different sweet potato varieties produced by the respondent (actual number). **Previous year’s sweet potato income**: represents the income earned by the respondent from sweet potato cultivation in the previous year (in f FCA and converted in dollar ($)). The local currency in Benin is the West African CFA franc. At the time the data was collected, 1 US Dollar was equivalent to 554.78 CFA francs.

**Table S3:** Chi-square analysis of the extent on farmers selection criteria (i) heterogeneity for Bets (Bi), Worst (Wi), and Agg.BWi

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Bi |  | Wi |  | Agg.BWi |
| Criteria | *χ²* | *df* | *p value* |  | *χ²* | *df* | *p value* |  | *χ²* | *df* | *p value* |
| High vine yield | 882.02 | 4 | <0.001 |  | 63.79 | 4 | <0.001 |  | 190.91 | 8 | <0.001 |
| High root yield | 162.94 | 4 | <0.001 |  | 995.02 | 4 | <0.001 |  | 510.60 | 8 | <0.001 |
| Early maturing | 82.98 | 4 | <0.001 |  | 656.15 | 4 | <0.001 |  | 289.84 | 8 | <0.001 |
| Insect tolerance | 908.79 | 4 | <0.001 |  | 212.98 | 4 | <0.001 |  | 423.71 | 8 | <0.001 |
| Disease tolerance | 1380.79 | 4 | <0.001 |  | 279.56 | 4 | <0.001 |  | 598.31 | 8 | <0.001 |
| Roots shelf life | 381.94 | 4 | <0.001 |  | 396.21 | 4 | <0.001 |  | 428.55 | 8 | <0.001 |
| Roots firmness | 1265.04 | 4 | <0.001 |  | 505.96 | 4 | <0.001 |  | 928.69 | 8 | <0.001 |
| Waterlogging tolerance | 1088.31 | 4 | <0.001 |  | 224.65 | 4 | <0.001 |  | 563.36 | 8 | <0.001 |
| Sweetness | 607.40 | 4 | <0.001 |  | 177.56 | 4 | <0.001 |  | 338.70 | 8 | <0.001 |
| Fiber content  | 289.65 | 3 | <0.001 |  | 104.27 | 4 | <0.001 |  | 153.57 | 7 | <0.001 |
| Marketability | 52.35 | 4 | <0.001 |  | 592.44 | 4 | <0.001 |  | 312.75 | 8 | <0.001 |
| Roots size | 259.15 | 4 | <0.001 |  | 580.42 | 4 | <0.001 |  | 460.20 | 8 | <0.001 |
| Roots shape | 349.96 | 4 | <0.001 |  | 52.85 | 4 | <0.001 |  | 136.91 | 8 | <0.001 |

χ²: Chi-square; df: degree of freedom

**Table S4:** Fit statistics for number of the latent class identification

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Model | LL | df | BIC | LR | AIC | Entropy |
| 1 class | -2631.73 | 13 | 5343.72 | 5289.46 | 1307.23 |  - |
| 2 class | -2421.78 | 42 | 5102.86 | 4927.56 | 973.36 | 0.86 |
| 3 class | -2281.25 | 71 | 5000.85 | 4704.51 | 920.34 | - |
| 4 class | -2196.27 | 100 | 5009.92 | 4592.55 | 867.86 | - |
| 5 class | -2564.54 | 129 | 5925.50 | 5387.08 | 1211.47 | - |
| 6 class | -2542.21 | 158 | 6059.89 | 5400.43 | 1242.53 | - |

LL: Log-likelihood, df: degree of freedom, LR: Likelihood ratio, AIC: Akaike information criterion, BIC Bayesian Information Criterion, -: Entropy not computable

**Table S5:** Distribution of demographic variables by latent class

|  |  |  |
| --- | --- | --- |
|  | Class |  |
|  | Yield potential | Market value | Plant resilience | p-value |
| Class size | n = 265 | n = 149 | n = 66 |  |
| *Department* |  |  |  | < 0.001 |
| Alibori | 102 (38.5) | 12 (8.0) | 65 (98.5) |  |
| Atlantique | 145 (54.7) | 4 (2.7) | 1 (1.5) |  |
| Ouémé | 18 (6.8) | 133 (89.2) | 0 (0) |  |
| *Gender* |  |  |  | < 0.001 |
| Women | 39 (14.7) | 13 (8.7) | 1 (1.5) |  |
| Men | 226 (85.3) | 136 (91.3) | 65 (98.5) |  |
| *Age* |  |  |  |  |
| 18-29 | 26 (9.8) | 27 (18.1) | 6 (9.1) |  |
| 30-49 | 177 (66.8) | 62 (41.6) | 37 (56.0) |  |
| ≥50 | 62 (23.4) | 60 (40.2) | 23 (34.8) |  |
| *Education* |  |  |  | < 0.001 |
| Alphabetized | 41 (15.4) | 2 (1.3) | 4 (6.0) |  |
| None | 156 (58.8) | 46 (30.8) | 47 (71.2) |  |
| Primary | 49 (18.5) | 77 (51.6) | 6 (9.1) |  |
| Secondary | 19 (7.1) | 24 (16.1) | 9 (13.6) |  |
| *Farming experience* |  |  |  | < 0.001 |
| 1-10 | 25 (9.4) | 54 (36.2) | 13 (19.7) |  |
| 11-20 | 103 (38.8) | 44 (29.5) | 20 (30.3) |  |
| >20 | 137 (51.7) | 51 (34.2) | 33 (50.0) |  |
| *Household size* |  |  |  | < 0.001 |
| 0-4 | 43 (16.2) | 35 (23.5) | 6 (9.1) |  |
| 5-9 | 140 (52.8) | 90 (60.4) | 24 (36.3) |  |
| >10 | 82 (30.9) | 24 (16.1) | 36 (54.5) |  |
| *Sweet potato production area* |  |  |  | < 0.001 |
| <0.25 | 82 (30.94) | 116 (77.85) | 54 (81.82) |  |
| 0.25-0.5 | 111 (41.2) | 23 (15.4) | 8 (12.1) |  |
| >0.5 | 72 (27.1) | 10 (6.7) | 4 (6.0) |  |
| *Number of sweet potato varieties produced* |  |  |  | < 0.001 |
| 1 | 247 (93.2) | 111 (74.5) | 25 (37.8) |  |
| 2 | 12 (4.5) | 38 (25.5) | 32 (48.4) |  |
| >2 | 6 (2.26) | 0 (0) | 9 (13.6) |  |
| *Sweet potato income* |  |  |  | < 0.001 |
| $0-50 | 48 (18.1) | 45 (30.2) | 46 (69.7) |  |
| $51-150 | 65 (24.5) | 66 (44.3) | 13 (19.7) |  |
|  >$150 | 152 (57.3) | 38 (25.5) | 7 (10.6) |  |

The p-value represents the result of a Chi-square (χ²) goodness-of-fit analysis for differences between each class for factor variable frequencies.