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Analysis of common bean (*Phaseolus vulgaris* L.) trade in Cameroon: A trader's perspective of preferred varieties and market traits

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Analysis Of Common Beans Trade in Cameroon: A Trader's Perspective of Preferred Varieties and Market Traits

Market intelligence provides information on emerging market trends, consumer preferences, and demands to guide the development of new traits and varieties.

Results show that:

- Red and white beans are the most popular beans in and out of the country



- These beans are preferred because they fetch a good price, good taste, high yield and early maturity
- More women are in retail than in wholesale



Information was collected from 175 traders

100 wholesalers



50 retailers



25 aggregators



In conclusion, apart from the variety colour, traders consider other traits like taste, yields, affordability and maturity. Lastly, developing bean varieties and identifying bean traits has to be demand driven

1 **Analysis of Common Bean (*Phaseolus vulgaris* L.) Trade in Cameroon: A Trader's**
 2 **Perspective of Preferred Varieties and Market Traits**

3 **Abstract**

4 Common beans contribute towards enhancing food and nutritional security in developing
 5 countries. Producing the right varieties entails that the interest of all value chain actors, like
 6 traders (wholesalers, retailers, and aggregators), are considered in developing breeding
 7 priorities to meet local and export market demand. However, there is little or no information
 8 on traders' perspectives regarding the preferred common bean traits and variety; hence, this
 9 study sought to fill the gap. This study aimed to analyse common bean trade in Cameroon by
 10 focusing on the trader's perspective of preferred varieties and market traits. A market survey
 11 was conducted in August 2021. Four regions of Cameroon (Adamawa, Centre, West, and
 12 Littoral) were purposively selected based on accessibility, and high concentration of bean
 13 traders and are considered the major bean distribution and consumption hubs. A two-stage
 14 random sampling was then used to select 175 traders. Data was gathered using a semi-
 15 structured questionnaire and analysed descriptively using Excel and STATA 14 software. The
 16 results indicated that 80% of bean trade was with Gabon and Congo. The majority of the
 17 sampled traders were men, as more men are involved in the bean business. Also, the majority
 18 of the traders did not participate in contract farming arrangements. Two market classes of beans
 19 were popular: red and white beans. The red beans were popular in the market probably due to
 20 good market traits such as affordability, good taste, high yield and early maturity. White bean
 21 market class was popular in the export market. Conversely, the black bean market class was
 22 the least preferred in the market. The most preferred market traits for improved common beans
 23 were good taste and acceptability by buyers. White beans fetched the highest wholesale (1.72
 24 USD) and retail (1.41 USD) prices per kg on the market. Conversely, black beans fetched the
 25 lowest wholesale (0.8 USD) and retail (0.75 USD) prices per kg on the market. We recommend
 26 that common bean breeders should involve traders as important stakeholders whose market
 27 intelligence can be useful in developing improved bean varieties, which are demand-driven.
 28 Also, governmental and non-governmental agencies should promote improved common bean
 29 varieties to enhance productivity that meets the high demand in local and export markets.
 30 Besides, they should promote traders' participation in contract farming arrangements to
 31 enhance the steady supply of improved common beans on the market.

32 **Keywords:** Common beans, traders' perspective, preferred varieties, traits, market classes,
 33 market intelligence.

34 1. Introduction

35 Common beans (*Phaseolus vulgaris* L.) are a major food staple cultivated greatly in developing
36 countries (Hummel et al., 2018). They contribute towards enhancing food and nutritional
37 security in rural and urban households (Basavaraja et al., 2021). Beans are a source of minerals,
38 proteins, vitamins, and dietary fibre hence they are widely consumed in sub-Saharan Africa
39 (Maphosa & Jideani, 2017). In Cameroon, there has been a tremendous increase in the
40 production of common beans, thus indicating that the crop is the most grown and marketed
41 legume (FAO, 2022). The country is ranked the seventh largest bean producer in Sub-Sahara
42 Africa after Tanzania, Uganda, Kenya, Burundi, Ethiopia and Rwanda (FAO, 2023; Siri &
43 Nchanji, 2022). From 2017 to 2021, bean production in the country increased from 365,295.33
44 to 373, 624.39 metric tons (FAO, 2022). This can be attributed to the increased demand for
45 common beans due to the changing demography and increased urbanization. Therefore, there
46 is an investment opportunity in the bean value chain for farmers and traders in the country.

47 Common bean is a tropical crop and performs well in agro-ecologies characterized by rainfall
48 amount ranging from 300mm to 600 mm and temperature ranging from 15 °C–30 °C (Philipo
49 et al., 2021). In Sub-Saharan Africa, common beans are typically intercropped with other crops
50 such as maize (*Zea mays* L.) (Semalulu et al., 2022). According to Reinprecht et al. (2020),
51 common beans grow well on fertile soils that contains a minimum of 2% organic matter.
52 Common beans may be planted using manure or mineral fertilizer. However, in developing
53 countries, many farmers consider common beans to be a low-input crop hence they allocate
54 scarce resources to other crops such as cereals (OECD, 2016). In the early growth stage, the
55 crop faces greater competition from weeds hence it is critical to undertake appropriate weed
56 control measures to ensure proper establishment of the crop (Karavidas et al., 2022). Besides,
57 insect pests and diseases can be controlled using agro-chemicals or biological control measures
58 to minimize yield losses. Dry beans are harvested when the seed have matured and turned
59 yellow (Uebersax et al., 2021). Common beans are then threshed and dried to attain a moisture
60 content of 11-12% before being stored in a cool dry place to enhance the quality. Conversely,
61 snap beans that are used as vegetables can be harvested two to four weeks after flowering.

62 Common beans are a major source of income for farming households in Cameroon (Kweyu et
63 al., 2022). Legumes fetch relatively higher prices on the market than cereals hence they have
64 become a major attraction to farmers (Tabe-Ojong et al., 2021). However, grain market
65 regulations and higher taxes have discouraged traders and farmers from participating in formal

66 markets. Therefore, they are attracted to informal markets that are characterized by bilateral
67 bargaining arrangements that exclude transactions from authorities (Nkendah, 2013). Informal
68 market arrangements can significantly influence farmers' returns from the sale of beans hence
69 searching for alternative markets is crucial to minimize potential market risks and loss of
70 returns.








71 The bean marketing links in the country include farmers selling through a cooperative, a lead
72 farmer, contractual arrangements or directly to the exporters and agro-processors (Kweyu et
73 al., 2022). Grain aggregation at the local level plays a critical role in value chain development
74 by addressing the market access challenge. According to Siri et al. (2017), bean aggregators
75 sometimes purchase directly from farmers, thus reducing transportation costs. Therefore,
76 bean's marketing constraints can be addressed by establishing better linkages to off-takers or
77 aggregators hence pulling higher volumes that, in turn, will attract high-value actors such as
78 agro-processors and exporters.

79 Despite, the increasing demand for common beans in export, regional, and domestic markets,
80 production, post-harvest handling, trade and consumption are constrained by factors such as
81 poor soils, drought, pests and diseases, market inequalities and unstructured markets (Siri &
82 Nchanji, 2022). Demand-led common bean breeding will be critical in meeting consumers' and
83 traders' dynamic varietal and trait preferences (Assefa et al., 2019). Common bean breeding
84 aims to develop improved varieties with desirable characteristics such as high yields, nice
85 colour, storability, resistance to pests and diseases, resistance to drought, good taste, short
86 cooking time, and nutrition that are critical for meeting consumer and traders' preferences in
87 various markets.

88 The Pan Africa Bean Research Alliance, in collaboration with the Institute of Agricultural
89 Research for Development, developed different interventions to promote the use of improved
90 seed varieties in Cameroon (PABRA, 2015; Siri et al., 2016). Sixteen market-driven bean
91 varieties that are micronutrient-rich and stress-tolerant are being promoted through various
92 stakeholder meetings and participatory varietal selection with different value chain actors and
93 partners. This has enhanced the country's production and marketing of improved common
94 beans. Table 1 presents the list of released and non-released improved haricot bean varieties in
95 Cameroon. The non-released varieties are traditional varieties grown and sold by farmers in
96 and out of the country. These include the dwarf (FEB 192, 22-GL) and the climber (NUV-6).
97 The traits of the varieties include high nutrition content, high yield, tolerance to soil fertility,

98 resistance to pests and diseases, acceptable consumption and market traits such as good taste,
 99 good grain colour and size (IRAD, 2015). The improved common bean variety market classes
 100 include red, red mottled, yellow, brown, black and white. Market classes are the main colours
 101 of the varieties driven by the market.

102 **Table 1: List of released and non-released improved common bean varieties in**
 103 **Cameroon**

| Variety | Market class | Growth type | Grain size | Grain colour | Maturity (days) | Yield Potential (ton(t)/ha) | Year of release |
|------------|--------------|--------------|------------|---|-----------------|-----------------------------|-----------------|
| GLP-190-C | Red mottled | Dwarf | Large |  | 70 – 80 | 1.2 – 2.0 | 1990 |
| GLP-190-S | Red mottled | Dwarf | Large |  | 70 – 80 | 1.2 – 2.0 | 1990 |
| MEX 142 | White | Climber | Small |  | 90 - 110 | 2.5 – 3.0 | 2012 |
| ECAPAN 021 | Red mottled | Dwarf | Medium |  | 75 – 80 | 2.0 - 2.5 | 2012 |
| TY3396-12 | Yellow | Semi-climber | Small |  | 80 – 90 | 2.5 – 3.2 | 2012 |
| MAC 33 | Red mottled | Climber | Medium |  | 90 – 110 | 2.0 – 2.5 | 2012 |
| MAC 55 | Brown | Climber | Large |  | 90 – 110 | 2.0 - 2.5 | 2012 |

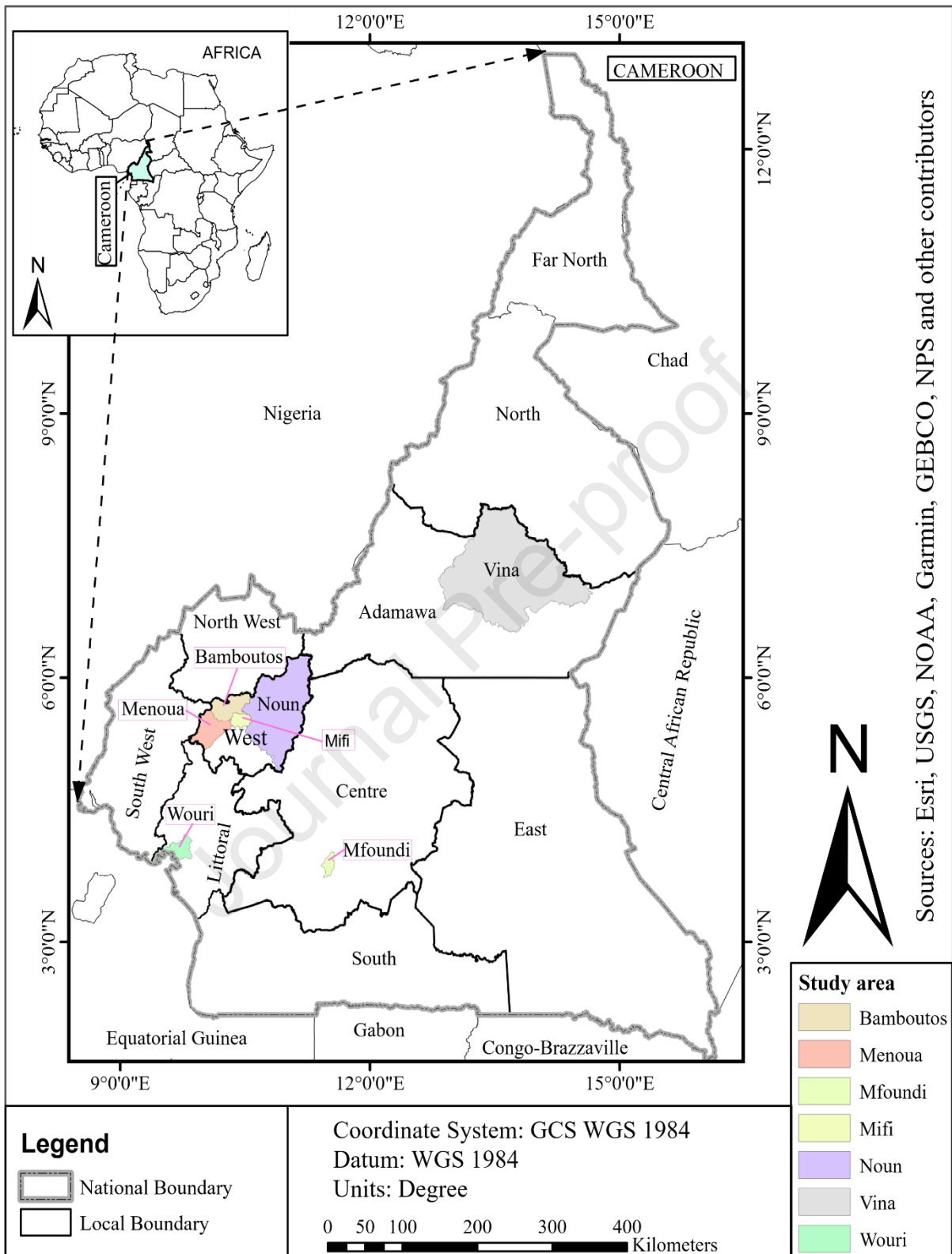
| | | | | | | | |
|----------------|----------------|---------|--------|---|----------|-----------|-------------------|
| NITU G16157 | Brown | Dwarf | Large |  | 65 – 70 | 2.0 – 2.5 | 2012 |
| KJ4/3 | Yellow | Climber | Medium |  | 65 – 70 | 1.5 – 2.0 | 2012 |
| DOR-701 | Red | Climber | Small |  | 80 – 90 | 2.0 – 3.0 | 2015 |
| NUV- 109-2 | Red | Climber | Small |  | 90 – 110 | 2.5 – 3.2 | 2015 |
| PNN | Black | Dwarf | Small |  | 65 – 70 | 1.2 – 2.5 | 2015 |
| BGG | White | Dwarf | Large |  | 65 – 70 | 1.2 -2.0 | 2015 |
| NUA-99 | Red mottled | Dwarf | Medium |  | 70 – 80 | 1.5 – 2.5 | 2015 |
| FEB 192 | Red mottled | Dwarf | Large |  | 70 - 80 | 1.5 – 2.0 | Yet to release |
| 22-GL | White | Dwarf | Large |  | 65 – 70 | 1.5 – 2.5 | Yet to release |
| NUV-6 | Black | Climber | Small |  | 90 – 110 | 1.5 – 2.5 | Yet to release |

106 There has been recent interest in traders' preferred common bean varieties and market traits in
107 Africa (Sichilima et al., 2016; Birachi et al., 2020). However, no information exists in
108 Cameroon; hence, this study sought to fill the gap. The aim of the study was to analyse common
109 bean trade in Cameroon by focusing on the trader's perspective of preferred varieties and
110 market traits. Lack of information and knowledge regarding improved varieties and preferred
111 traits demanded in the market negatively impacts common bean productivity, adoption and
112 marketing. Understanding the traders' preferences for common beans is important to enhance
113 and develop a bean market and trade and prioritise varieties to be bred by breeders.
114 Stakeholders such as extension agents, NGOs and researchers need market intelligence from
115 traders to understand market systems. The findings of this study provide insight into various
116 bean stakeholders who work towards expanding the bean market. This paper addresses three
117 questions: 1) Who are the major suppliers and buyers of common beans in the market? 2) What
118 are the market-preferred variety traits and the market class of common beans? and 3) What is
119 the average quantity of beans sold per month?

120 **2. Materials and Methods**

121 **2.1 Study Area**

122 The study was conducted in Cameroon and targeted four regions (Adamawa, Centre, West, and
123 Littoral) as indicated in Figure 1. The regions were selected based on accessibility and the fact
124 that they are bean distribution and consumption hubs selected using the bean corridor approach
125 developed by PABRA colleagues. The bean corridor approach aims to eliminate production
126 bottlenecks to ensure that farmers gain access to superior quality seeds and consumers have
127 greater access to bean grain of improved bean varieties (PABRA, 2017). Centre and Littoral
128 regions are located in the equatorial zone, which is characterised by a hot and humid climate
129 with adequate rainfall. The two regions have a dense population that exceeds 32 inhabitants
130 per square kilometre. Conversely, the West region has a cooler climate with an average
131 population density that exceeds 132 inhabitants per square kilometre (Cameroon Embassy,
132 USA, 2023). Adamawa is located in a savannah zone characterized by temperate, hot and dry
133 climates and a sparse population (10.7 inhabitants per square kilometre). The major urban
134 centres in the four regions include Ngaoundere, Bafoussam, Yaounde and Douala. Apart from
135 common beans, other agricultural produce traded in the region includes cowpeas, soybean,
136 sorghum, millet and maize.



138 Figure 1: Map showing the study area.

139 Source: (Victor Nyamolo)

140 **2.2 Sampling and data collection**

141 A market survey was conducted in August 2021 within four regions of Cameroon (Adamawa,
 142 Centre, West, and Littoral). The regions were purposively selected based on accessibility, high
 143 concentration of beans traders and the fact that they are beans distribution and consumption
 144 hubs selected using the bean corridor approach developed by PABRA colleagues. A total of
 145 175 traders were selected using a two-stage random sampling. In the first stage, eleven major
 146 markets with relatively high concentrations of bean traders were purposively selected. The
 147 selected markets were spread across several divisions in the four regions. The markets included
 148 Marche Bafoussam, Marche Balessing, Marche Bantai, Marche Central, Marche Foumbot,
 149 Marche Mbouda, Marche Mfoundi, Marche Mokolo, Marche Sandaga, Marche de pomme, and
 150 Marche Mifi. In the second stage, purposive, systematic random sampling was used to select
 151 175 traders from a list of 311 bean traders (sample frame) obtained from the market authorities
 152 in the targeted regions. The target respondents in this study were traders (wholesalers, retailers,
 153 and aggregators) who were engaged in the common beans trade, as indicated in Table 2. The
 154 study considered traders who pulled high volumes and could export common beans. In some
 155 regions, traders did not meet this criterion hence were not included in the study. Primary data
 156 was collected through face-to-face interviews, aided by semi-structured questionnaires.
 157 Information collected through the questionnaire included the gender of the respondent, type of
 158 trade, major suppliers and buyers, preferred improved bean varieties and traits in the market,
 159 major export markets, the average quantity of beans sold per month and the average prices per
 160 kg for different varieties sold.

161

162 **Table 2: Sample size by market and type of trader**

| Market/Type of trader | | | | Total | Total % (n=175) |
|--------------------------|-------------|-----------|-------------|-------|--------------------|
| | Wholesalers | Retailers | Aggregators | | |
| Marche Bafoussam | 10 | 5 | 0 | 15 | 8.57 |
| Marche Balessing | 10 | 5 | 5 | 20 | 11.43 |
| Marche Bantai | 10 | 5 | 0 | 15 | 8.57 |
| Marche Central | 10 | 5 | 5 | 20 | 11.43 |
| Marche Foumbot | 10 | 5 | 5 | 20 | 11.43 |
| Marche Mbouda | 10 | 5 | 5 | 20 | 11.43 |
| Marche Mfoundi | 10 | 5 | 0 | 15 | 8.57 |
| Marche Mokolo | 10 | 5 | 0 | 15 | 8.57 |
| Marche Sandaga | 10 | 5 | 0 | 15 | 8.57 |
| Marche de pomme | 10 | 5 | 0 | 15 | 8.57 |

| | | | | | |
|--------------|------------|-----------|-----------|------------|---------------|
| Marche Mifi | 0 | 0 | 5 | 5 | 2.86 |
| Total | 100 | 50 | 25 | 175 | 100.00 |

163

164 **2.3 Methods of data analysis**

165 The study primarily aimed at gaining a broad understanding of a subject matter, that is bean
 166 trade in Cameroon. Exploratory Data Analysis (EDA) techniques, including descriptive
 167 statistics (mean, median, standard deviation) and frequency distributions, were used to
 168 summarize the main aspects of the collected data. We analysed the data using STATA 14
 169 programme and Excel spreadsheet version 2016. While the primary aim of EDA is not
 170 hypothesis testing, we completed the analysis with inferential statistics using independent
 171 samples t-test and chi-square test to determine whether the differences in variables of difference
 172 were likely to be statistically significant. Thus, the inferential tests were also considered
 173 exploratory. The tests were used to assess the hypothesis; “Men perform better than women in
 174 common bean trade.” The monthly quantity sales, participation in common bean export trade
 175 and participation in contract arrangements were used as an indicators of performance. Tables
 176 and bar charts were used to present and visualize results from the analysis.

177

178 **3. Results and discussions**

179 **3.1 Summary statistics of the respondents**

180 The sampled traders included wholesalers, retailers and aggregators, as indicated in Table 3.
 181 The results indicate that 45.71% of the respondents were sampled from the West region, 20%
 182 from Adamawa, and the rest came from the Center and Littoral. Besides, the respondents were
 183 spread across major markets within various divisions. Most (74.86%) of the respondents were
 184 men, thus indicating that men dominate common bean marketing in Cameroon. This concurs
 185 with the findings of Siri et al. (2020), who indicated that men are more involved in the national
 186 and regional marketing nodes of common beans than women. According to Nakazi et al.
 187 (2017), men dominate the marketing of food crops since they tend to assert themselves as
 188 family providers and, hence are entitled to control income generated from the sale of food
 189 crops. However, the results indicated more women (72%) than men (28%) engaged in retail
 190 trade. Women engage in retail trade since it requires less capital than wholesale trade/grain
 191 aggregation. The results concur with those reported by Brenton et al. (2023), who indicated
 192 that women play a significant role in the African retail trade.

193 **Table 3. Distribution of sampled traders by region, division, gender and trade type**

| Type of trader | Wholesalers% (n=100) | Retailers% (n=50) | Aggregators% (n=25) | Total %(n=175) |
|-----------------|-------------------------|----------------------|------------------------|-------------------|
| Region | | | | |
| Adamawa | 20.00 | 20.00 | 20.00 | 20.00 |
| Center | 20.00 | 20.00 | | 17.14 |
| Littoral | 20.00 | 20.00 | | 17.14 |
| West | 40.00 | 40.00 | 80.00 | 45.71 |
| Division | | | | |
| Bamboutos | 10.00 | 10.00 | 20.00 | 11.43 |
| Menoua | 10.00 | 10.00 | 20.00 | 11.43 |
| Mifi | 10.00 | 10.00 | 20.00 | 11.43 |
| Vina | 20.00 | 20.00 | 20.00 | 20.00 |
| Noun | 10.00 | 10.00 | | 8.57 |
| Wouri | 20.00 | 20.00 | | 17.14 |
| Mfoundi | 20.00 | 20.00 | | 17.14 |
| Foumbot | | | 20.00 | 2.86 |
| Gender | | | | |
| Men | 94.00 | 28.00 | 92.00 | 74.86 |
| Women | 6.00 | 72.00 | 8.00 | 25.14 |

194

195 The t-test results for the retailers presented in Table 4 indicated that the association between
196 the monthly average quantity of common beans sold and gender was significant ($P < 0.1$). The
197 mean average quantity sold by women traders was higher (668.75 kg) than that of men (369.50
198 kg). The implication of the results is that women traders perform better in retail trade than men.
199 Probably, women traders were either more proactive or they had more social networks than
200 men hence, they were able to market their products through the networks. The findings are
201 consistent with those reported by Neneh et al. (2016), who indicated that women traders tend
202 to outperform their male counterparts. Besides, t-test results indicated that the association
203 between number of varieties sold and gender was significant ($P < 0.01$). The mean number of
204 varieties sold by women traders was higher (3.94) than that of men (2.71). The bean market
205 classes stocked by the traders included the red, red mottled, white, black and yellow beans.

206 **Table 4: Mean difference in quantity of common beans sold per month by traders'**
207 **gender**

| Variable | Pooled | Women | Men | P value |
|--------------------------------------|---------------|--------------|--------------|--------------|
| Wholesalers | N= 100 | n= 6 | n= 94 | |
| Average quantity sold per month (kg) | 2766.00 | 3900.00 | 2693.62 | 0.484 |
| Number of varieties sold | 2.92 | 3.33 | 2.89 | 0.517 |
| Retailers | N= 50 | n= 36 | n= 14 | |
| Average quantity sold per month (kg) | 584.96 | 668.75 | 369.50 | 0.074 |
| Number of varieties sold | 3.60 | 3.94 | 2.71 | 0.004 |
| Aggregators | N=25 | n=2 | n=23 | |
| Average quantity sold per month (kg) | 234056.00 | 242500.00 | 233321.70 | 0.947 |
| Number of varieties sold | 4.24 | 6.00 | 4.09 | 0.121 |

208

209 Table 5 results demonstrated that most (88%) sampled aggregators participated in the common
 210 bean export trade. However, the association of aggregators' participation in common bean
 211 export and gender was not significant. The common bean trade contributes significantly to the
 212 development of the economy in Cameroon. Cameroon is among the major producers and
 213 exporters of common beans in Africa hence, the trade has a positive impact on the overall
 214 economic growth in the country. In 2021, the country exported 6454.32 tons of beans that were
 215 valued at \$1.046 million (FAO, 2023). The common bean export trade enables the country to
 216 generate foreign exchange earnings which is crucial in stabilizing the country's balance of
 217 payment and enhancing economic development. Besides, the common beans export trade
 218 generates employment opportunities for traders, farmers and other individuals engaged in the
 219 value chain (Kweyu et al., 2022).

220 Chi-square results indicated that the association of participation in contract farming
 221 arrangements with the traders' gender was significant ($P < 0.1$). All sampled women aggregators
 222 engaged in contract arrangements with farmers. Conversely, only 39.13% of the male
 223 aggregators engaged in contract farming arrangements. The aggregate results indicated that
 224 56% of the sampled traders did not engage in contract arrangements with farmers. This
 225 proportion is probably high because aggregators in the study area are not informed about the
 226 benefits of engaging in contract arrangements with farmers.

227 **Table 5: Gendered participation in common bean export trade and contract farming**
 228 **arrangements**

| Variable | Pooled | Women | Men | P value |
|---|-------------|------------|-------------|---------|
| | N=25 | n=2 | n=23 | |
| Participation in bean export trade | | | | |
| No | 12.00 | 0.00 | 13.04 | 0.586 |

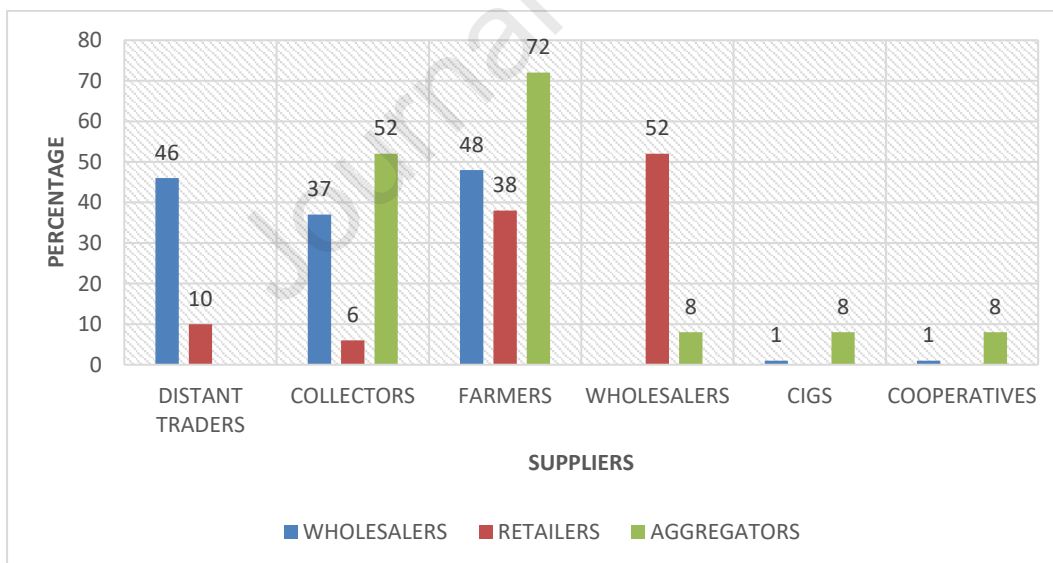
| | | | | |
|---|-------|--------|-------|-------|
| Yes | 88.00 | 100.00 | 86.96 | |
| Participation in contract farming arrangements | | | | |
| No | 56.00 | 0.00 | 60.87 | 0.096 |
| Yes | 39.13 | 100.00 | 39.13 | |

229

230 3.2 Major Suppliers and Buyers in the Market

231 3.2.1 Major suppliers of improved beans in the market

232 The major suppliers of common beans to traders were farmers and wholesalers, as indicated by
 233 the responses presented in Figure 2. However, the proportions indicated in the responses are
 234 generally low, implying that traders relied on multiple suppliers to ensure continuous supply
 235 in the market. Other suppliers indicated in the trader's responses included distance traders,
 236 collectors, Common Interest groups (GIGS) and cooperatives. This confirms the findings of
 237 Reardon et al. (2021), who reported that wholesalers cooperate with distant traders in supplying
 238 food to urban areas. The major suppliers to the aggregators were farmers. The results concur
 239 with Sperling et al. 2021 who indicated that most traders sourced their produce directly from
 240 farmers.



241

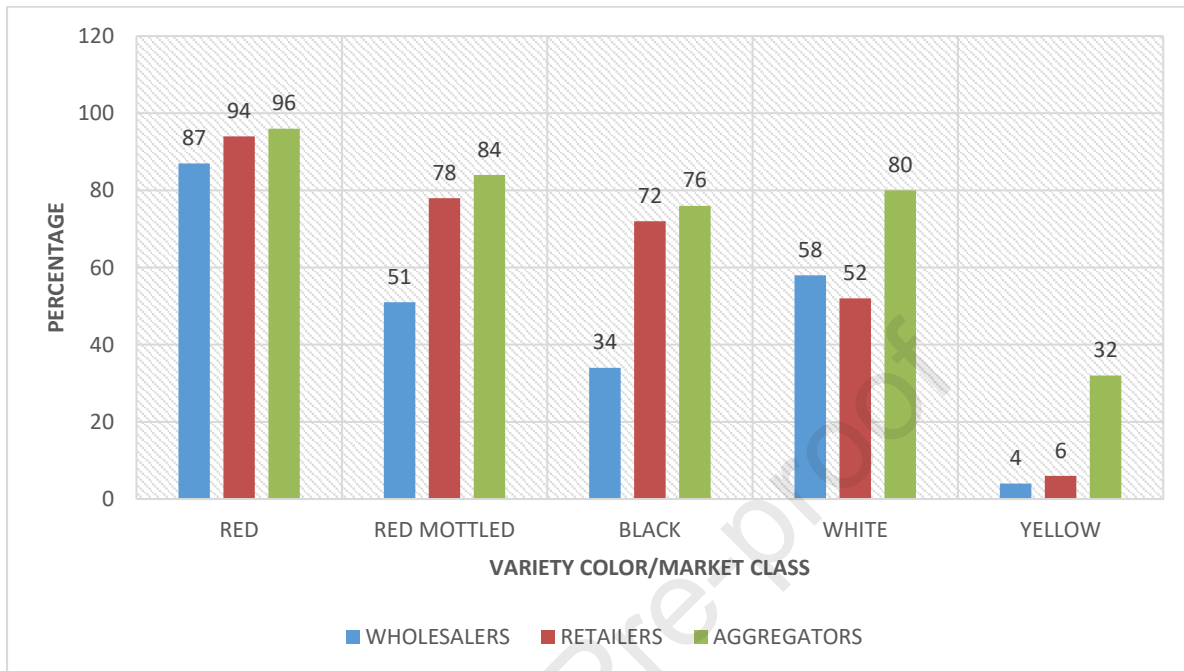
242 **Figure 2: Major suppliers of common beans on the market.**

243

244 3.2.2 Market class of beans supplied on the market.

245 Different market classes of beans were supplied in the market. The results presented in Figure
 246 3 indicate that a majority of the sampled traders stocked red beans. The color of the variety is
 247 popular in the market due to the eating culture of local consumers favoring red beans over other

248 colors. Also, improved red common bean varieties are preferred due to traits such as
 249 affordability, high yields and short maturity period. Conversely, yellow beans were the least
 250 stocked variety color in the market, probably due to low demand.



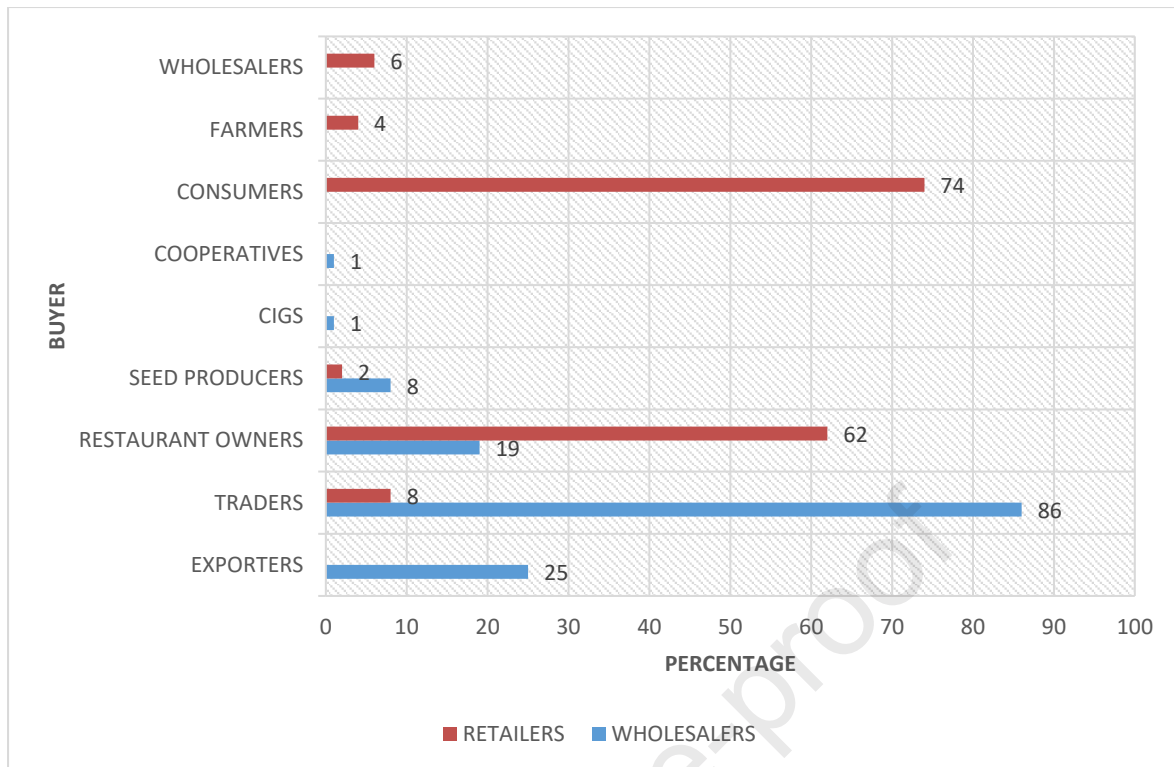
251

252 **Figure 3: Trader's responses regarding market class of beans**

253

254 3.3 Major buyers of improved beans in the market

255 Based on the results presented in Figure 4, a majority of the wholesalers (86%) and retailers
 256 (74%) indicated that the major buyers of common beans in the market were traders and
 257 consumers, respectively. Traders play a significant role in offsetting the produce held in the
 258 wholesale stores, thus helping the wholesalers to reduce storage costs. Besides, they link
 259 wholesalers to the consumers, thus contributing towards the development of the common beans
 260 market. Conversely, the results imply that consumers are the major purchasers of common
 261 beans from retail stores. The cost-friendliness of retailing makes it accessible and affordable to
 262 most consumers. Other buyers that were indicated in the responses included restaurant owners,
 263 exporters, wholesalers, farmers, seed producers, CIGs and cooperatives.

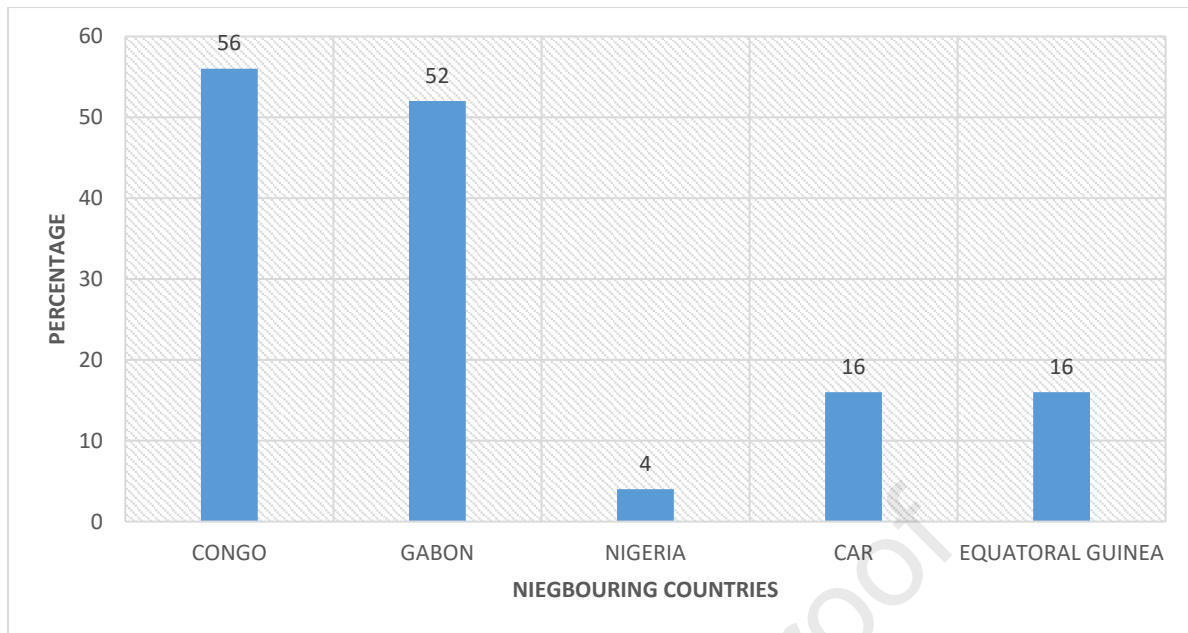


264

265 **Figure 4: Responses from retailers regarding major buyer**266 **3. Major export markets for improved common beans**

267 Figure 5 presents the results on major export markets indicated by aggregators' responses. 56%
 268 of the aggregators indicated that Congo and Gabon were the major export markets. Other export
 269 markets included Nigeria, the Central Africa Republic (CAR), and Equatorial Guinea. About
 270 80% of improved beans produced in Cameroon are sold to neighbouring countries such as
 271 Gabon, Equatorial Guinea and the Central Africa Republic and the national markets.

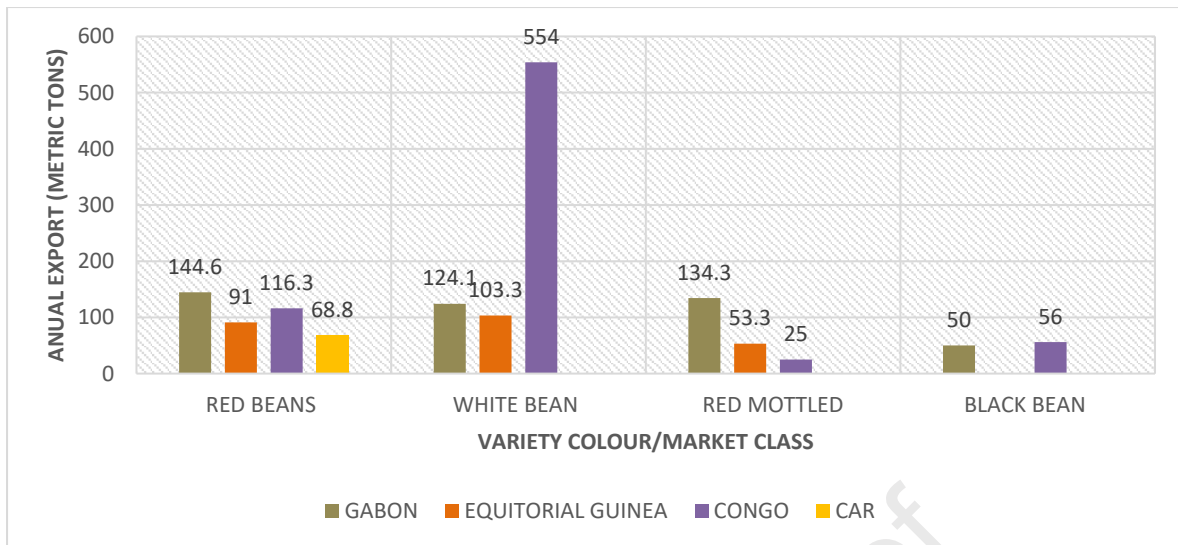
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273

274 **Figure 5. Responses from aggregators regarding major export market**275 **3.5 Average annual quantities of common beans exported**

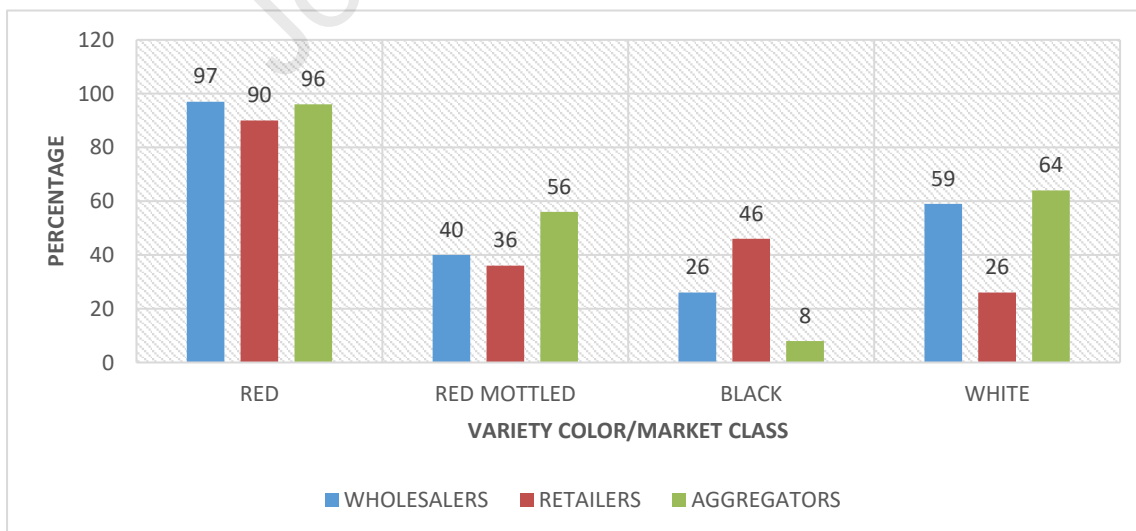
276 Figure 6 presents the results regarding the annual average quantity of common beans exported
 277 to different countries including Gabon, Equatorial Guinea, Congo and Central Africa Republic
 278 (CAR). The variety colours exported included red, white, red mottled and black beans. Largest
 279 quantity (554 tons) of white beans was exported to Congo. The high consumption of white
 280 beans in Congo could be attributed to the perceived health benefits associated with the variety
 281 colours. White beans are not only an excellent source of plant-based protein but also a source
 282 of complex carbohydrates that are useful in managing diabetes (Neil et al., 2019). Besides,
 283 white beans contain antioxidants, which have anti-cancer properties. A research conducted by
 284 Borresen et al. (2016) indicated that the consumption of white beans led to prevention and
 285 control of colorectal cancer.



286

287 **Figure 6: Average annual quantities of common bean exported to different countries**288 **3.6 Preferred common beans market classes and market traits**289 **3.6.1. Preferred Common beans market class**

290 Figure 7 presents the results on preferred common bean market classes by buyers on the market.
 291 Red bean varieties were popular in the market, as indicated by high responses from the sampled
 292 traders. This could be attributed to factors such as high yields, affordability, good storability,
 293 eating culture and early maturity. The results concur with Tigist et al. (2020), who indicated
 294 that red beans were preferred in the market due to traits such as early maturity and good
 295 storability.

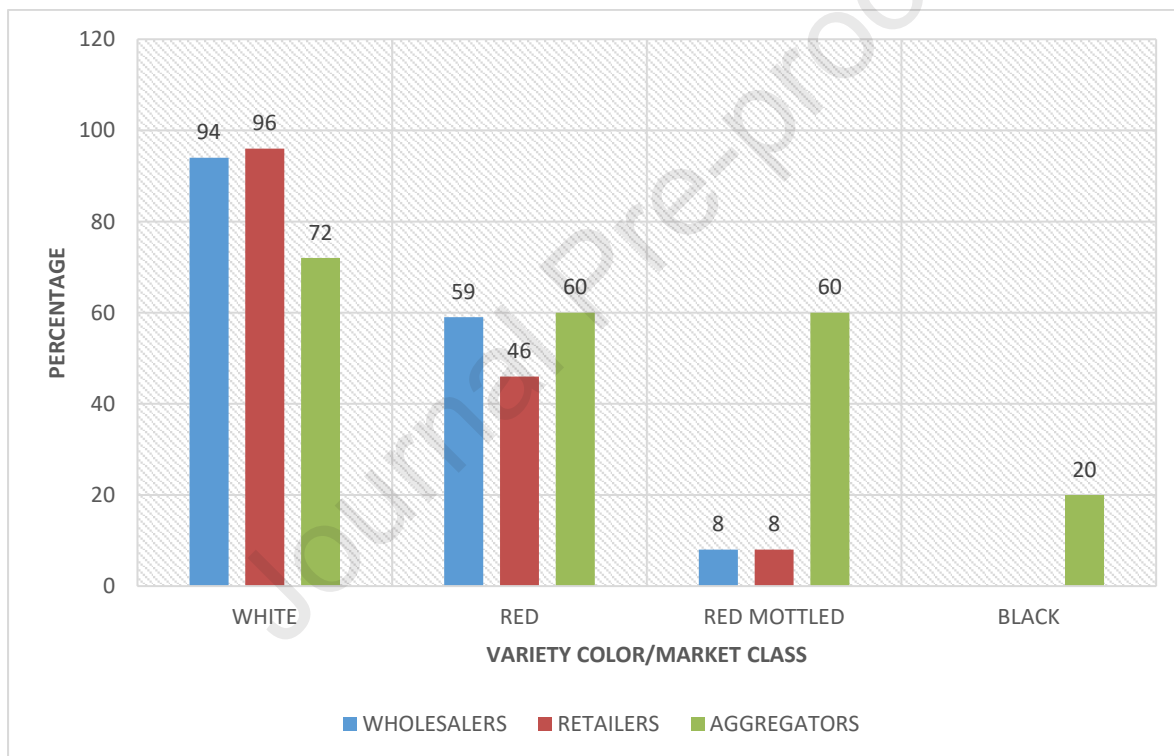


296

297 **Figure 7: Responses from traders regarding the most preferred common beans market**
 298 **class by buyers**

3.6.2 Most preferred common beans market classes in the export market

The results presented in Figure 8 indicated that white beans were the most preferred variety in the export market. This could be attributed to the high demand for white beans in the market. White beans are highly demanded in the export market since they are popular in the baking and canning industries (Amongi et al., 2021). According to Venter (2019), the demand for white beans in the African canning industry has not been met due to low production. White beans are preferred since they cook quickly and can enhance the nutritional quality of composite products (Hoxha et al., 2020). The next on the list is red beans, probably preferred by the exporters due to their good traits, including short cooking time, favourable tastes and good price. Other variety colours indicated in the traders' responses included red mottled, and black.



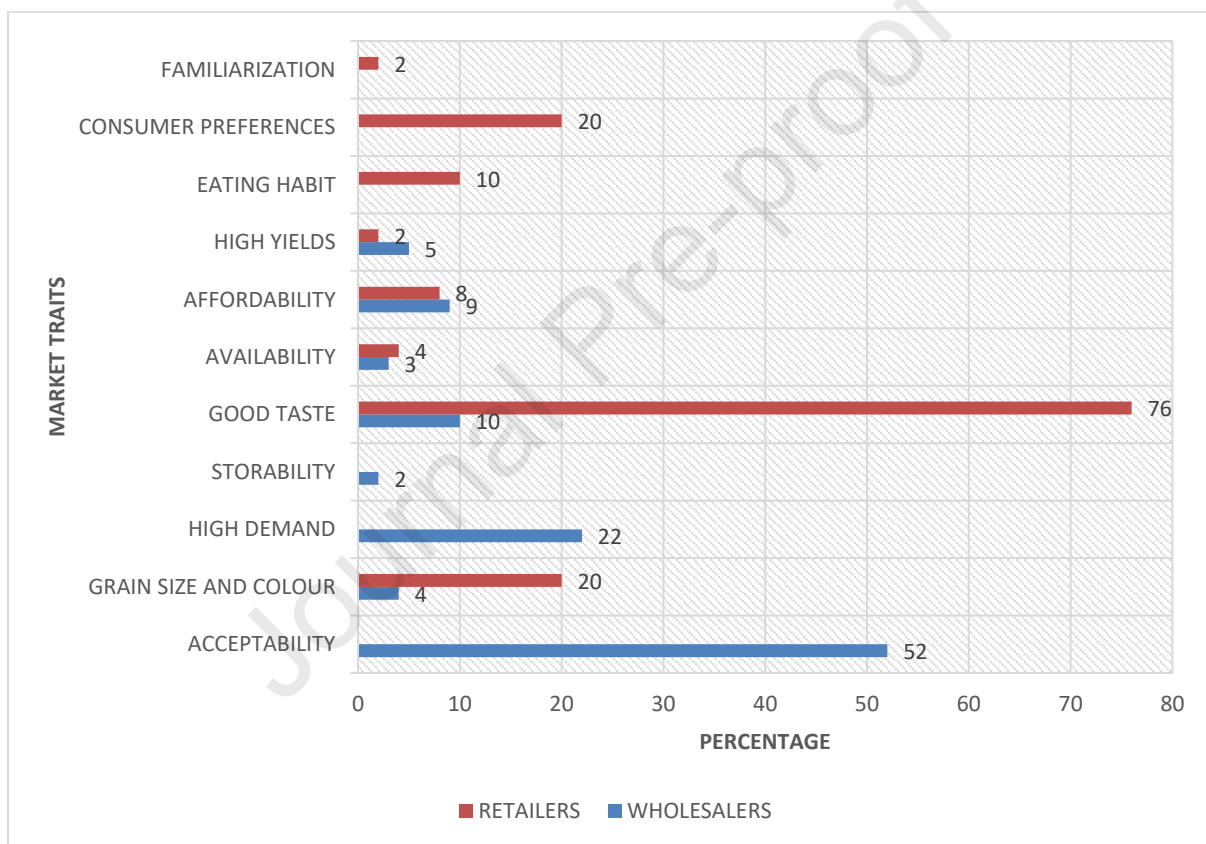
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310 **Figure 8: Most preferred market classes in the export market**

3.6.4 Preferred market traits for improved common bean varieties

311 In Figure 9, the majority of the retailers (76%) indicated that the most preferred market trait
 312 for common bean variety was good taste. The results imply that consumers preferred improved
 313 bean varieties that had good taste. Similar findings were reported by Birachi et al. (2020), who
 314 indicated that taste is a highly preferred trait in the common beans market. Contrary, Swema
 315 and Mwinuka (2021) reported that the most preferred traits of improved beans were grain
 316 colour, size and good gravy quality. Conversely, a substantial proportion of the wholesalers
 317

318 (56%) indicated that ‘acceptability’ was the most preferred market trait for common beans. The
 319 acceptability trait is nuanced as this could be influenced by diverse intersectional elements like
 320 wealth class, age, sex etc. The results imply that common bean variety acceptability is a key
 321 preferred market trait. Previous studies have indicated that consumers accept and prefer
 322 improved bean varieties that have good taste and take a short time to cook (Singh et al., 2017;
 323 Mutari et al., 2021). Also, consumers prefer improved bean varieties that are affordable and
 324 have good gravy quality (Atilola, 2018). Other preferred market traits indicated in the traders’
 325 responses included familiarization, consumer preferences, eating habits, high yields,
 326 affordability, availability, storability, high demand, and grain size and colour.



327

328 **Figure 9: Traders’ response regarding preferred market traits of improved common**
 329 **bean varieties.**

330

331 3.7 Average quantities of beans sold per month

332 Based on the results presented in Table 6, the average quantity of common beans sold per
 333 month was 234056 kg among the aggregators, 2766 kg among the wholesalers and 584.96 kg
 334 among the retailers. The aggregators had the highest monthly sales volume (234056 kg),
 335 probably because of high export demands. Conversely, retailers had the lowest monthly sales

336 volumes (584.96 kg) probably because they sold the produce in small quantity packages,
 337 mostly to local consumers.

338

339 **Table 6. Average quantities of beans sold per month**

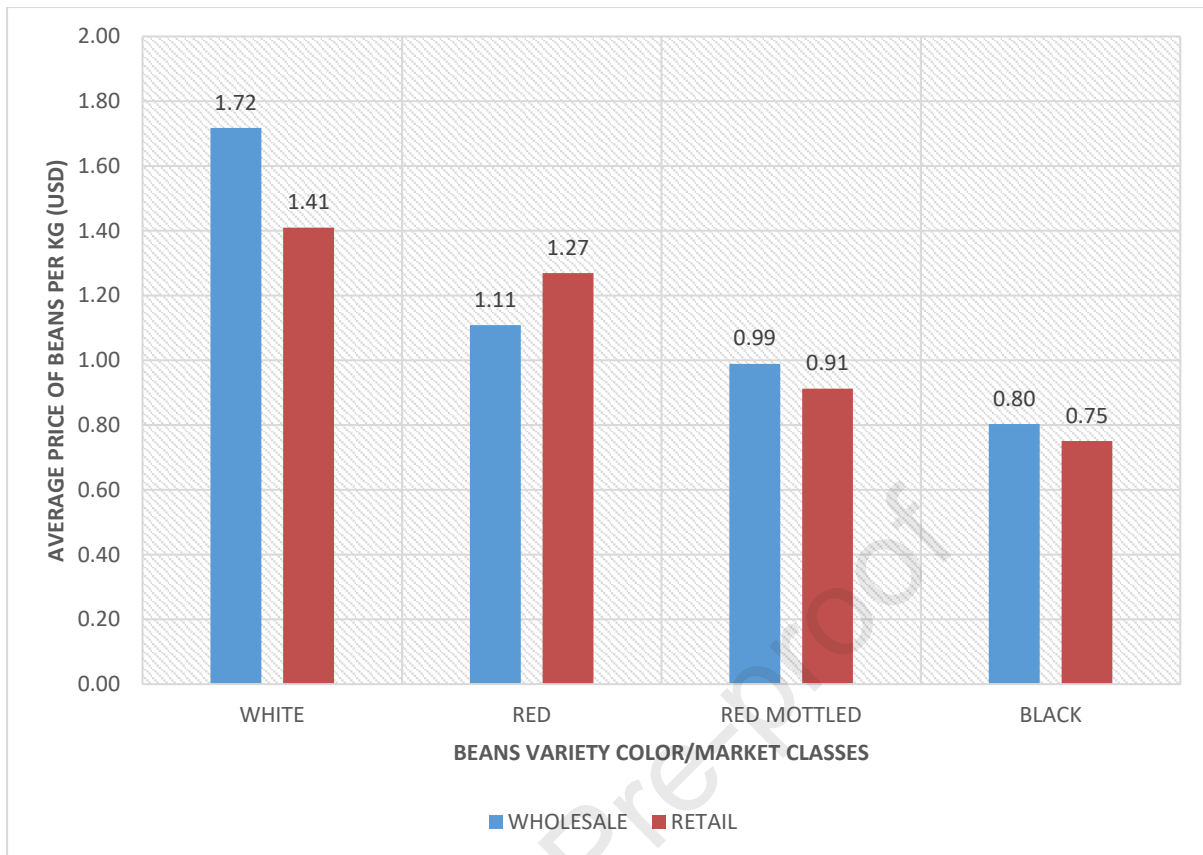
| Type of trader | Obs | Mean | Std. Dev. | Min | Max |
|----------------|--------|-----------|-----------|----------|-----------|
| Wholesalers | 100.00 | 2766.00 | 4062.75 | 200.00 | 2860.00 |
| Retailers | 50.00 | 584.96 | 531.89 | 83.00 | 3400.00 |
| Aggregators | 25.00 | 234056.00 | 181413.50 | 17500.00 | 780000.00 |

340

341 **3.8 Average prices per kg by different varieties of common beans**

342 White beans fetched the highest wholesale (1.72 USD) and retail (1.41 USD) prices on the
 343 market (Figure 10). Next to the white beans were red beans that fetched 1.11 USD and 1.27
 344 USD wholesale and retail prices, respectively. Besides, the wholesale price of red mottled
 345 beans was 0.99 USD, while the retail price was 0.91 USD. This concurs with the findings of
 346 Sichilima et al. (2016), who reported that white bean varieties fetched higher prices on the
 347 market than red-mottled beans. Conversely, black beans fetched the lowest wholesale (0.80
 348 USD) and retail (0.75 USD) prices on the market. Interestingly, the price set by wholesalers
 349 for the improved bean varieties was higher than that set by the retailers for the same
 350 commodities. Perhaps, the wholesalers targeted a premium market that included the export
 351 market, which is characterized by higher prices than domestic markets.

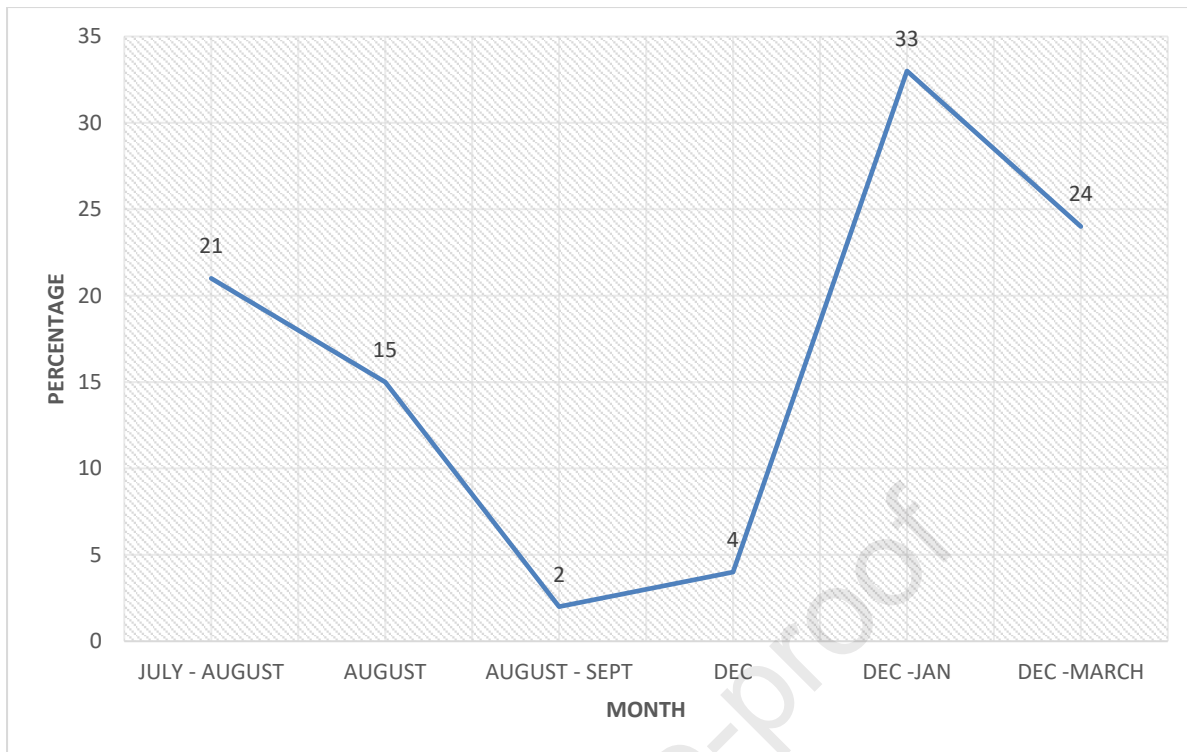
352



353

354 **Figure 10: Average prices for various common bean variety colors/market classes**355 **3.9 Peak sales season for improved beans**

356 December and January were the peak sales months among the traders, as presented in Figure
 357 11. The period coincides with the post-harvest and consumption time. Also, during this period,
 358 farmers purchase beans to be used as seeds during the main season. These are also months with
 359 big events such as Christmas and the New Year. The results suggest the need for traders to
 360 stock adequate quantities of common beans in order to meet the high market demand during
 361 the peak period. This can be attained by engaging farmers in contract arrangements to ensure
 362 a steady supply of common beans in the market.



363

364 **Figure 11: Traders' response regarding peak sales month**365 **4 Conclusion**

366 Our study revealed gender disparity in common bean trade, with men dominating the industry.
 367 Probably, the trade required huge capital investments hence, it favoured men, who tend to be
 368 more endowed financially than women. However, more women than men participated in the
 369 common bean retail trade, which is associated with relatively less capital investment compared
 370 to wholesale trade. Besides, the study indicated that 88% of the sampled aggregators engaged
 371 in common bean export trade. The major export market for improved common bean varieties
 372 was Congo and Gabon. Common bean export trade generates foreign earnings, which
 373 significantly contributes to the growth of the Cameroon economy. Also, the results revealed
 374 that most aggregators (56%) did not engage farmers in contract arrangements, probably due to
 375 a lack of information regarding the benefits of contractual arrangements. Promoting contractual
 376 arrangements between farmers and traders would trigger a steady supply of common beans on
 377 the market, especially during the peak sales period. The main actors in the common bean value
 378 chain were farmers and traders. Therefore, reinforcing the collaboration between farmers and
 379 traders is crucial in strengthening common bean trade in the country.

380 Information regarding traders' preferred common bean varieties and market traits is critical in
 381 guiding common bean breeders. Access to this information would enable breeders to develop

382 improved common bean varieties that are acceptable and highly demanded on the market. Our
383 study provides insights into traders' perspectives regarding preferred common bean varieties
384 and market traits. The results revealed that the market's most preferred common bean classes
385 were the red and white beans. The two market classes were popular in the local and export
386 markets respectively. Red beans were preferred probably due to the culture favouring the
387 variety colour and traits such as affordability, good taste and early maturity. White beans
388 fetched the highest price on the market compared to the other market classes. The global market
389 for white beans has significantly increased due to its perceived health and nutritional benefits.
390 For instance, white beans contain high levels of antioxidants, which have anti-cancer
391 properties. The high demand for improved common beans calls for increased efforts by relevant
392 stakeholders in enhancing production and marketing.

393 Based on the findings of this study, common bean breeders need to involve traders as important
394 stakeholders whose knowledge can be useful in developing improved bean varieties. Also,
395 government and non-governmental agencies should train common bean traders on the benefits
396 of engaging in contract farming arrangements. Promoting contract farming will enhance the
397 steady supply of highly demanded improved common beans in the market. Besides, they should
398 intensify the promotion of improved common bean varieties seed to enhance production and
399 meet the high demand on the market.

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Highlights

1. Women engage more in retail than wholesale trade/grain aggregation.
2. Market intelligence is important in guiding breeding programmes.
3. Main market classes in Cameroon are red and white beans.
4. Red bean varieties are popular for their taste, yield, and early maturity.
5. White beans were popular in the export market, fetching the highest prices.

Conflicts of Interest: The authors declare no conflict of interest

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