

Addressing micronutrient deficiency in Cameroon through common bean biofortification



Chronic micronutrient deficiencies of iron, zinc and vitamins are prevalent among the Cameroon population. Women of reproductive age and children under five are hit the hardest, with detrimental effects on child development, human functionality and productivity. The prevalence of anemia among Cameroonian children is 57% with the regions of the East (65%) and the Far North (64%) having the highest anemia prevalence's among children aged 6-59 months. The North-West (44%) and Yaoundé (43%) show the lowest percentages. Among women aged 15-49, anemia prevalence is 40%. By region, the prevalence of anemia among women of 15-49 years, rises from a minimum of 24% in the North West to a maximum of 54% among the coastal residents of Douala.

Anemia is affecting the poorest and most vulnerable populations, leading to iron deficiency anemia (IDA). Children with anemia have low attention and retention capacities affecting their education and cognitive development. It is estimated that 35-50% of under-five mortality in Cameroon is attributed to malnutrition. Mortality rates of infants and children aged less than five years have not changed much in the past 20 years in Cameroon.

In Cameroon, 39% of the population live below the poverty line, with 56% of them residing in the northern regions. The high



unemployment rate in the country is affecting people's access to nutritious foods. Malnutrition in the country is further exacerbated by climatic shocks; floods and drought, insecurity and food crisis as a result of land degradation, inefficient agricultural practices, high post-harvest losses and fragmented markets.

In developing countries such as Cameroon, the physical impairment associated with malnutrition is estimated to cost 2 to 3% of gross domestic product (GDP) per year, with associated developmental and cognitive impairment while Iron deficiency in adults' decreases productivity between 5 – 17%, and an equivalent to 0.6 to 3.4% of GDP, lost as a result of poor cognitive development in children. In recent years, Cameroon has made significant efforts in the improvement of food security and addressing chronic malnutrition. However, micronutrient deficiency among children under five remains a major public health problem. Current interventions in the country to address health disorders related to malnutrition include vitamins and minerals supplementation.

Beans (*Phaseolus vulgaris* L.) are the most grown and consumed legume in Cameroon. It is one of the most affordable ways of addressing dietary needs in most urban and rural areas in the country and most sub-Saharan Africa countries. As food,





they are affordable and consumed countrywide and all year round because of their longer shelf life, providing a steady and lucrative source of income for many rural households.

Complementing existing nutrition interventions such as the blanket supplementary feeding programme with food-based strategies, including biofortification of common beans, would be a sustainable strategy to address malnutrition among communities. Biofortification is proving a sustainable and cost effective strategy to address malnutrition, especially IDA in Cameroon and other developing countries.

The Institute of Agricultural Research for Development (IRAD) in collaboration with Pan Africa Bean Research Alliance (PABRA) is working towards achieving the Sustainable Development Goals (SDG) of; Zero hunger, No poverty and Gender equality in Cameroon by introducing fourteen improved common bean varieties of different market classes: red mottled (Ecapan 021, NUV-99, Feb 192, Mac 33), cream (TY3396-12, Mac 55, Nitu), small white (Mex 142), and large white (BGG and 22-GL), yellow (KJ4/3), small red (NUV-109-2, DOR-701), and small black (PNN). These cluster of beans have either bush and climbing traits. Out of these, 11 of these common beans (*Phaseolus Vulgaris* L.) released are biofortified.

How biofortified beans are addressing nutrition and food insecurity

Biofortification is a process through which the nutritional value – vitamins or minerals of a food crop is enhanced through conventional breeding. Through biofortification, vitamins and minerals such as iron, zinc, provitamin A etc. are enhanced. Eleven high iron and zinc beans have been released in Cameroon after a recent nutritional screening of more than 30 common bean varieties (local landraces and improved bean varieties). The adoption and dissemination of these newly identified high iron and zinc varieties will contribute to addressing iron and zinc deficiency among women and children under five. Growing and selling beans will also ensure income and food security for the household. Common beans are the most grown and consumed legume and affordable source of protein in Cameroon. The release of high iron and zinc beans and subsequent incorporation into the household diets is a cost-effective intervention in addressing health disorders related to inadequate intake of iron and zinc.



Micronutrient rich bean varieties in Cameroon

GLP190-S



GROWTH HABIT: Bush bean

COLOR TYPE: Red mottled

ORIGIN: CIAT/PABRA

LARGE SEEDED

IRON: 75-77.6 ppm

ZINC: 25.9 ppm

YIELD POTENTIAL: 1.2 to 2 tons per hectare

MATURITY: 70 days after planting

AGRO-ECOLOGICAL ZONE (AEZ): II, III, IV and V

High to low attitude, best suited for mid attitude

RESISTANCE/TOLERANT: Anthracnose, angular leaf spot and bean virus

MARKET CLASSIFICATION: 1

RELEASED YEAR: 1990

MEX142



GROWTH HABIT: Climbing bean

COLOR TYPE: Navy or white

ORIGIN: CIAT/PABRA

SMALL SEEDED

IRON: 84.1-85 ppm

ZINC: 34.9 -37 ppm

YIELD POTENTIAL: 2,5 to 3 tons per hectare

MATURITY: 90 days after planting

AGRO-ECOLOGICAL ZONE (AEZ): II, III, IV and V

High to low attitude, Best suited for mid attitude

RESISTANCE/TOLERANT: Anthracnose, angular leaf spot and bean virus

MARKET CLASSIFICATION: 2

RELEASED YEAR: 2012

Ty3396-12



GROWTH HABIT: Climbing bean

COLOR TYPE: Cream tripped with black

ORIGIN: CIAT/PABRA

SMALL SEEDED

IRON: 69.2-72.1 ppm

ZINC: 26.3-28.1 ppm

YIELD POTENTIAL: 2.5 to 3.2 tons per hectare

MATURITY: 80 days after planting

High to low attitude, best suited for mid attitude

AGRO-ECOLOGICAL ZONE (AEZ): II, III, IV and V

RESISTANCE/TOLERANT: Anthracnose, angular leaf spot and bean virus

MARKET CLASS: 3

RELEASED YEAR: 2012

MAC 33



GROWTH HABIT: Climbing bean

COLOR TYPE: Red mottled

ORIGIN: CIAT/PABRA

MEDIUM SEEDED

IRON: 86-93.2 ppm

ZINC: 33.7-35.5 ppm

YIELD POTENTIAL: 2 to 2.5 tons per hectare

MATURITY: 90 days after planting

High to low attitude, best suited for mid attitude

AGRO-ECOLOGICAL ZONE (AEZ): II, III, IV and V

RESISTANCE/TOLERANT: Anthracnose, angular leaf spot and bean virus

MARKET CLASSIFICATION: 3

RELEASED YEAR: 2012

MAC 55



GROWTH HABIT: Climbing bean

COLOR TYPE: Cream tripped with red

ORIGIN: CIAT/PABRA

LARGE SEEDED

IRON: 73.7 ppm

ZINC: 32.7ppm

YIELD POTENTIAL: 2 to 2.5 tons per hectare

MATURITY: 90 days after planting

High to low attitude, best suited for mid attitude

AGRO-ECOLOGICAL ZONE (AEZ): II, III, IV and V

RESISTANCE/TOLERANT: Anthracnose, angular leaf spot and bean virus

MARKET CLASSIFICATION: none

RELEASED YEAR: 2012

KJ4/3



GROWTH HABIT: Climbing bean

COLOR TYPE: Yellow-green

ORIGIN: CIAT/PABRA

MEDIUM SEEDED

IRON: 80.7-81.8 ppm

ZINC: 32.2-35.2 ppm

YIELD POTENTIAL: 1.5 to 2.5 tons per hectare

MATURITY: 90 days after planting

High to low attitude, best suited for mid attitude

AGRO-ECOLOGICAL ZONE (AEZ): II, III, IV and V

RESISTANCE/TOLERANT: Anthracnose, angular leaf spot and bean virus

MARKET CLASSIFICATION: none

RELEASED YEAR: 2012

BGG



GROWTH HABIT: Bush bean

COLOR TYPE: White

ORIGIN: Local landrace

LARGE SEEDED

IRON: 70.3-74.3 ppm

ZINC: 29.7-30.8 ppm

YIELD POTENTIAL: 1.2 to 2 tons per hectare

MATURITY: 70 days after planting

High to low attitude, best suited for mid attitude

AGRO-ECOLOGICAL ZONE (AEZ): II, III, IV and V

RESISTANCE/TOLERANT: Anthracnose, angular leaf spot and bean virus

MARKET CLASSIFICATION: none

RELEASED YEAR: 2015

NUA 99



GROWTH HABIT: Bush bean

COLOR TYPE: Red mottled

ORIGIN: CIAT/PABRA

MEDIUM SEEDED

IRON: 71.2-77 ppm

ZINC: 32.4-32.5 ppm

YIELD POTENTIAL: 1.5 to 2.5 tons per hectare

MATURITY: 70 days after planting

High to low attitude, best suited for mid attitude

AGRO-ECOLOGICAL ZONE (AEZ): II, III, IV and V

RESISTANCE/TOLERANT: Anthracnose, angular leaf spot and bean virus

MARKET CLASSIFICATION: 1

RELEASED YEAR: 2015

FEB-192



GROWTH HABIT: Bush bean

COLOUR TYPE: Red Kidney

ORIGIN: CIAT/PABRA

LARGE SEEDED

IRON: 69.4-74.3ppm

ZINC: 27.4-31.3 ppm

YIELD POTENTIAL: 1.5 to 2 tons per hectare

MATURITY: 75 days after planting

High to low attitude, best suited for mid attitude

AGRO-ECOLOGICAL ZONE (AEZ): II, III, IV and V

RESISTANCE/TOLERANT: Anthracnose, angular leaf spot and bean virus

MARKET CLASSIFICATION: 1

RELEASED YEAR: Yet to be released

NUV 6



GROWTH HABIT: Climbing bean

COLOUR TYPE: Brilliant black

ORIGIN: CIAT/PABRA

SMALL SEEDED

IRON: 87-94.8 ppm

ZINC: 28.5-30.3 ppm

YIELD POTENTIAL: 1.5 to 2.5 tons per hectare

MATURITY: 90 days after planting

High to low attitude, best suited for mid attitude

AGRO-ECOLOGICAL ZONE (AEZ): II, III, IV and V

RESISTANCE/TOLERANT: Anthracnose, angular leaf spot and bean virus

MARKET CLASSIFICATION: 3

RELEASED YEAR: Yet to be released

*All the bean varieties can be grown in the II, III, IV and V Agro-ecological zones, but Web Blight (WB) disease is common in low lands and so precautions have to be taken.

*Market classification of bean varieties based on market surveys

VARIETIES	MARKET CLASSIFICATION	MARKET CLASS	EXPLANATION
GLP 190-S	1	Red mottled	Both national and export market
FEB 192	1	Red kidney	Both national and export market
NUA 99	1	Red mottled	Both national and export market
MEX 142	2	Navy or white	Mostly export market
TY3396-12	3	Cream	Niche market
MAC 33	3	Red mottled	Niche market
NUV-6	3	Black	Niche market

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www.pabra-africa.org



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