# NUTRIENT COMPOSITION OF PULSES GROWN IN KONKAN REGION

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The chemical analysis of seventeen pulse genotypes revealed that T-21, ICPL-87 (Pigeonpea), ACCK-11, ACCK-210 (Horsegram), ACCW-147, ACCW-126 (Lablab bean) and ACCC-210 of Cowpea were promising genotypes with respect to the content of macro nutrients in the grain. Among the promising genotypes, ACCC-210, ACCK-210, ACCK-11, ICPL-87 and ACCW-126 genotypes registered their superiorty in having higher levels of nutritionally important nutrient-calcium in their repective groups. The correlation of calcium with nitrogen was negative and significant. Among the four pulses, the horsegram was much superior in respect of micronutrient composition. All genotypes of horsegram were rich in iron content (36.37 mg %). The correlation of iron with copper and manganese in grain was positive and highly significant.

**Keywords :** *Cajanus cajan; Dolichos biflorus; Lablab purpureous;* Macronutrients; Micronutients; *Vigna catjang.*

## Introduction

Pulses serve as the chief source of protein in Indian vegetarian diets. After vegetables, they are also economical sources of vitamins and minerals in the diet. Besides protein, the varietal differences in mineral content are wide and locational factors are also known to affect the nutritional composition of pulses[1].

The wide variability character is therefore being exploited under pulse development programmes to boost production and upgrade the nutritional quality of commonly consumed Indian pulses. The information on the nutrient status of these genotypes under Konkan condition is not available and hence seventeen genotypes of four pulses were analysed for macro and micronutrient contents.

## Materials and Method

The grains cleaned, ground to 60 mesh flour and used for chemical analysis.

*Macronutrients :* The mineral solution of ash of 1.0g pulse flour was prepared in minimum volume of HCI and volume was made upto 50 ml with distilled water[2].

The potassium in diluted mineral solution was estimated with Systronic's Flame photometer[3]. The phosphorus in the mineral solution was estimated by the colorimetric method[4], while the calcium and magnesium were determined tritrametrically[5].

*Micronutrients :* The triacid extract of the pulse flour were prepared as described in manual of laboratory techniques[2]. The iron, copper, manganese and zinc in triacid extract were estimated on Atomic absorption spectrophotometer (model Varian AA-1475) employing standard operating conditions.

*Statistical analysis :* The correlation coefficient between various parameters were worked out employing the standard statistical methods[6]. The data reported here are an average of diplicate which agreed very closely.

## Results and Discussion

The data on phosphorus, potassium, calcium and magnesium content in seventeen genotypes of four pulses are presented (Table 1). The phosphorus content ranged from 251 to 402 mg per 100 g, highest being in ACCW-147 of lablab bean and the lowest in ACCC-216 of cowpea. The genotypes ACCC-210 of cowpea, ACCK-11 of horsegram and T-21 of pigeonpea had highest phosphorus content in their respective groups. The mean phosphorus content was highest in lablab

**Table 1.** Content of major and secondary nutrients in various promising genotypes of pulses in Konkan.

| Genotypes | Macronutrients (mg/100 g) | | | |
|---|---|---|---|---|
| | P | K | Ca | Mg |
| **Pigeonpea** | | | | |
| ACCT-1 | 288 | 954 | 71 | 167 |
| ICPL-87 | 256 | 996 | 76 | 160 |
| T-21 | 305 | 1071 | 57 | 157 |
| Mean | 283 | 1007 | 68 | 161 |
| **Horsegram** | | | | |
| ACCK-11 | 347 | 944 | 88 | 142 |
| ACCK-210 | 321 | 731 | 91 | 112 |
| ACCK-292 | 332 | 774 | 67 | 144 |
| DPL-1 | 277 | 689 | 72 | 135 |
| Mean | 319 | 784 | 80 | 133 |
| **Cowpea** | | | | |
| ACCC-198 | 255 | 1007 | 63 | 242 |
| ACCC-210 | 400 | 1071 | 98 | 301 |
| ACCC-216 | 251 | 986 | 88 | 136 |
| ACCC-244 | 287 | 1102 | 56 | 176 |
| VCM-8 | 318 | 890 | 87 | 184 |
| C-152 | 331 | 1049 | 71 | 244 |
| Mean | 307 | 1017 | 77 | 214 |
| **Lablab bean** | | | | |
| ACCW-116 | 390 | 1102 | 55 | 267 |
| ACCW-126 | 396 | 1071 | 76 | 213 |
| ACCW-147 | 402 | 1092 | 52 | 331 |
| Konkan wal-1 | 379 | 1124 | 66 | 241 |
| Mean | 392 | 1097 | 62 | 263 |
| Over all mean | 325 | 976 | 72 | 193 |

**Table 2.** Interrelation of major and secondary nutrients in various pulses in Konkan.

| Functions | K | Ca | Mg | N |
|---|---|---|---|---|
| P | 0.371 | -0.046 | 0.648** | 0.210 |
| K | | -0.380 | 0.667** | 0.489* |
| Ca | | | -0.309 | -0.542* |
| Mg | | | | 0.289 |

**Table 3.** Content of micronutrients in various promising genotypes of pulses in Konkan.

| Genotypes | Micronutrients (mg/100 g) | | | |
|---|---|---|---|---|
| | Fe | Cu | Mn | Zn |
| **Pigeonpea** | | | | |
| ACCT-1 | 7.00 | 1.00 | 1.50 | 4.50 |
| ICPL-87 | 7.00 | 1.00 | 2.00 | 4.50 |
| T-21 | 6.50 | 1.00 | 1.50 | 3.50 |
| Mean | 6.83 | 1.00 | 1.66 | 4.16 |
| **Horsegram** | | | | |
| ACCK-11 | 49.00 | 3.00 | 3.50 | 4.00 |
| ACCK-210 | 41.00 | 1.50 | 3.00 | 3.50 |
| ACCK-292 | 17.50 | 1.00 | 4.00 | 4.00 |
| DPL-1 | 38.00 | 3.50 | 3.00 | 5.00 |
| Mean | 36.37 | 2.20 | 3.37 | 4.12 |
| **Cowpea** | | | | |
| ACCC-198 | 6.00 | 1.00 | 2.00 | 3.00 |
| ACCC-210 | 6.50 | 1.00 | 2.00 | 4.00 |
| ACCC-216 | 9.00 | 1.50 | 1.50 | 4.50 |
| ACCC-244 | 9.50 | 1.00 | 1.50 | 4.50 |
| VCM-8 | 9.00 | 1.50 | 2.00 | 4.00 |
| C-152 | 10.00 | 1.00 | 1.50 | 4.00 |
| Mean | 8.33 | 1.16 | 1.75 | 4.00 |
| **Lablab bean** | | | | |
| ACCW-116 | 14.00 | 1.00 | 2.50 | 4.00 |
| ACCW-126 | 14.50 | 1.50 | 2.50 | 3.50 |
| ACCW-147 | 16.00 | 1.00 | 3.00 | 3.50 |
| Konkan wal-1 | 7.00 | 1.00 | 3.00 | 3.00 |
| Mean | 12.90 | 1.12 | 2.70 | 3.50 |
| Over all mean | 16.10 | 1.37 | 2.37 | 3.99 |

**Table 4.** Interrelation of micronutrients in various pulses in Konkan.

| Functions | Mn | Zn | Fe |
|---|---|---|---|
| Cu | 0.398 | 0.444 | 0.799** |
| Mn | | -0.144 | 0.647** |
| Zn | | | 0.184 |

bean (392 mg/100 g) followed by horsegram (319 mg/100 g) and was lowest in pigeonpea (283 mg/100 g). The values of phosphorus content observed in these genotypes were in fair agreement with the values of phosphorus reported by several workers[1,7-9].

The potassium content of seventeen genotypes of four pulses varied from 689 to 1124 mg per 100 g grains. The potassium content was highest in Konkan Wal-1 of lablab bean and lowest in DPL-1 of horsegram. The genotypes T-21 of pigeonpea, ACCK-11 of horsegram, ACCC-224 of cowpea and Konkan wal-1 of lablab bean had highest potassium content in their respective groups. The values of potassium content observed in these genotypes was in fair agreement with that reported[10]. On the basis of mean potassium content, the pigeonpea, cowpea and lablab bean were comparable with each other, since they had mean potassium content of 1007, 1017 and 1097 mg per 100 g, respectively.

The highest calcium content was observed in ACCC-210 of cowpea (98 mg/100g) and lowest in ACCW-147 of lablab bean (52 mg/100 g) with a mean calcium content of 72 mg per 100 g in the seventeen genotypes. The calcium content of pigeonpea, cowpea and lablab bean observed in present study was in fair agreement with reported values[8,11]. The horsegram genotypes had much lower (80 mg/100 g) calcium as compared to the values (150-287 mg/100 g) reported by several workers[7,12,13]. The cowpea genotypes showed the greatest variation of 75 per cent in their calcium content followed by lablab bean (46%) and the lowest variation was found in pigeonpea and horsegram (33.3 to 35.8 per cent). These results, therefore, suggest that there is a greater scope of selection for high calcium content in cowpea genotypes as compared to the genotypes of other pulses under study.

Magnesium content in whole grain of various genotypes varied from 112 to 331 mg per 100 g being highest in ACCW-147 of lablab bean and lowest in ACCK-210 of horsegram. The genotypes ACCT-1 of pigeonpea, ACCK-292 of horsegram, ACCC-210 of cowpea and ACCW-147 of lablab bean had highest magnesium content in their respective groups. These values of magnesium content were in close accordance with the reported values of magnesium[8,12].

Among the four pulses, lablab bean appeared to be superior to other pulses in respect of P, K and Mg content, where as horsegram was superior to other pulses in respect of Ca content.

The genotypes T-21 and ICPL-87 of pigeonpea, ACCK-11 and ACCK-210 in horsegram, ACCC-210 in cowpea and ACCW-147, ACCW-126 in lablab bean appeared to be promising genotypes with respect to macronutrients.

The correlation coefficient between the major secondary nutrients in the seventeen genotypes are presented (Table 2). The correlation of Mg with P and K in the grain was positive and highly significant. A significant correlation was also observed between N and K. The correlation between calcium and nitrogen was negative and significant. These results suggest that the efforts aimed at increasing the nitrogen or protein content in these genotypes shall result in a decrease in calcium levels in grain.

*Micronutrients :* The data on micronutrient content in seventeen genotypes of four pulses are presented ( Table 3).

Iron content of genotypes ranged from 6.50 to 49.0 with an overall mean of 16.10 mg per 100 g. The iron content was highest in ACCK-11 of horsegram and it was lowest in T-21 of pigeonpea. These values of iron content are in accordance with the values[1,12]. The genotypes, ACCT-1 and ICPL-87 of pigeonpea, ACCK-11 of horsegram, C-152 of cowpea, ACCW-147 of lablab bean had highest iron content in their respective groups. These values of iron content observed in these genotypes was in fair agreement with the reported values[12,13].

Copper content in seventeen genotypes

of four pulses varied from 1.00 to 3.50 mg per 100 g with an overall mean of 1.37 mg. The copper content in all the genotypes did not show much variation and was almost similar except in horsegram. The values of copper content were within range of 0.9 to 2.59 mg per 100 g reported by several workers[1,10,11,14] for pigeonpea genotypes. The genotypes horsegram and cowpea grown under Konkan region had higher content of copper in their grain as compared to the values for these crops[11].

The manganese content in four pulses varied from 1.5 to 4.00 mg per 100 g. The mean manganese content was highest in horsegram (3.37 mg/100 g)followed by lablab bean (2.70 mg/100 g) and lowest in pigeonpea (1.66 mg/100 g). The genotypes with relatively higher manganese content were ACCK-292, ACCK-11,ACCK-210, DPL-1, Konkan wal-1 and ACCW-147. These values of manganese content observed in present study were slightly higher than the values (0.71 to 1.27 mg/100 g) reported for pigeonpea[1,14].

Zinc varied between 3.00 and 5.00 mg per 100g in all the seventeen genotypes. The genotype with highest zinc content was DPL-1 of horsegram. Zinc content of seventeen genotypes of four pulses was comparable with each other except that of lablab bean genotypes which had slightly lower zinc content in their grain. These values for zinc content were slightly higher than the reported values of 2.7 to 3.6 mg per 100 g[1,14]. However, Nwokolo[10] had reported much lower values of 2.4 mg per 100 g for zinc content in pigeonpea varieties.

Among the four pulses, the horsegram was much superior in respect of micronutrient content. On the basis of micronutrient composition, Konkan wal-1, ACCC-198, ACCC-210, ACCK-292 were found to be poor as compared to other genotypes in their respective groups. Other genotypes did not show much variation and were almost similar in respect of Fe, Cu, Mn and Zn contents within their respective groups. The correlation coefficient between the micro nutrients in the seventeen genotypes are presented (Table 4). The correlation of iron with copper and manganese in the grain was positive and highly significant. The iron also had positive correlation with zinc but it was not significant. A positive correlation was also observed between copper and manganese and copper and zinc but it was not significant.

These results suggest that the interaction among Fe, Cu, Zn and Mn in the grain of these pulses is in favour of iron which is one of the limiting nutrient in the Indian diets and is therefore encouraging from view point of increasing its concentration in the pulse grain.

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