

Nutritional and functional value of Ecuadorian traditional legume

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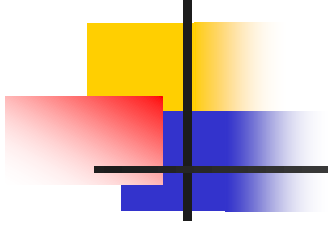
Project “Valorization of the quality of Ecuadorian traditional foods”

- **Researched by:**

- Universidad Técnica Particular de Loja
- Escuela Superior Politécnica del Litoral
- Instituto Nacional de Investigaciones Agropecuarias
- Escuela Politécnica Nacional
- Universidad Técnica de Ambato

- **Financed by:**





INTRODUCTION

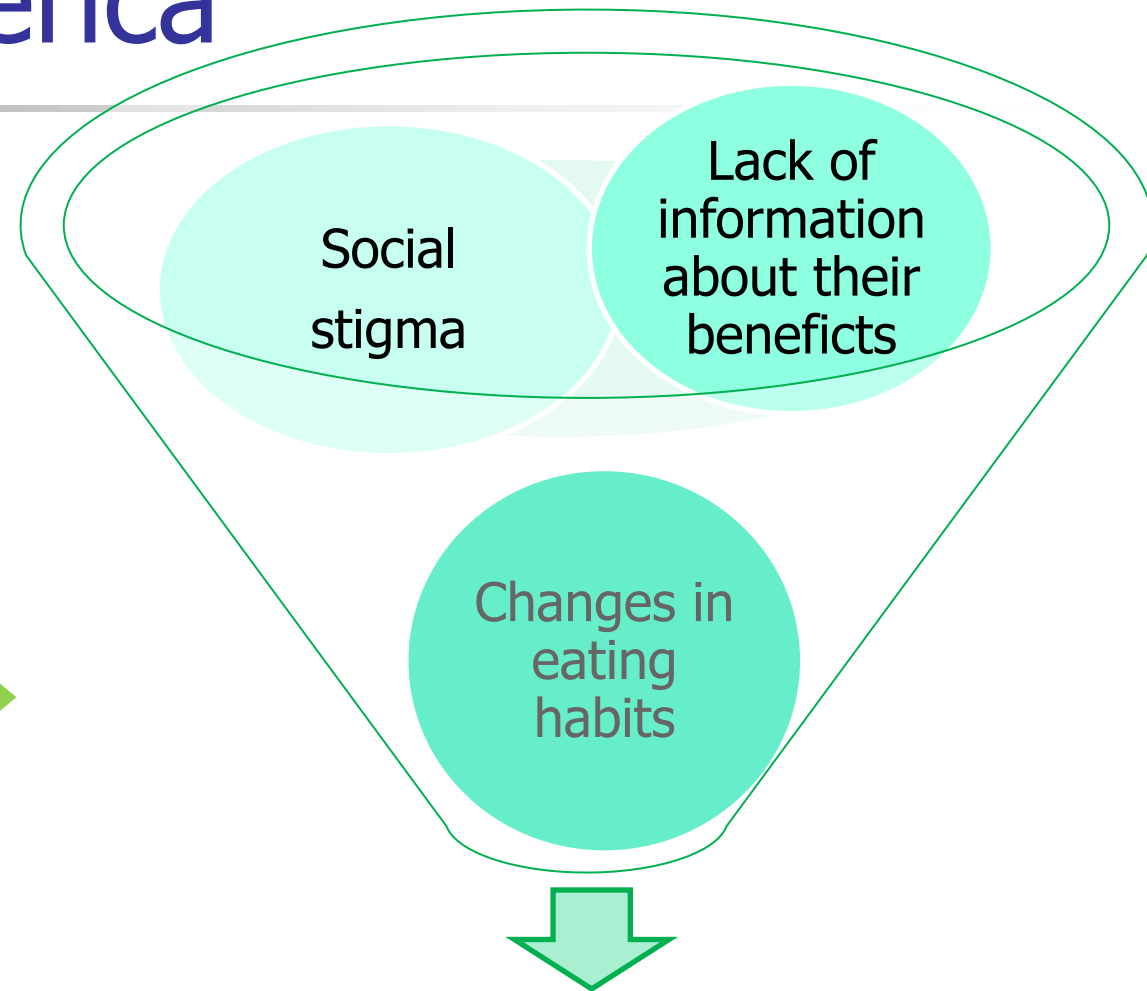
Legume in Latin America

Have been relevant for eating of Andean populations

Compete with more commercial crops

Fall in production volumes and number of producers

Represent only 1.1% of total crops



Legume in Ecuador

Low contribution level to the diet

3 %
protein

1,6 %
carbohydrates

12,7 %
dietary fiber

Average consumption

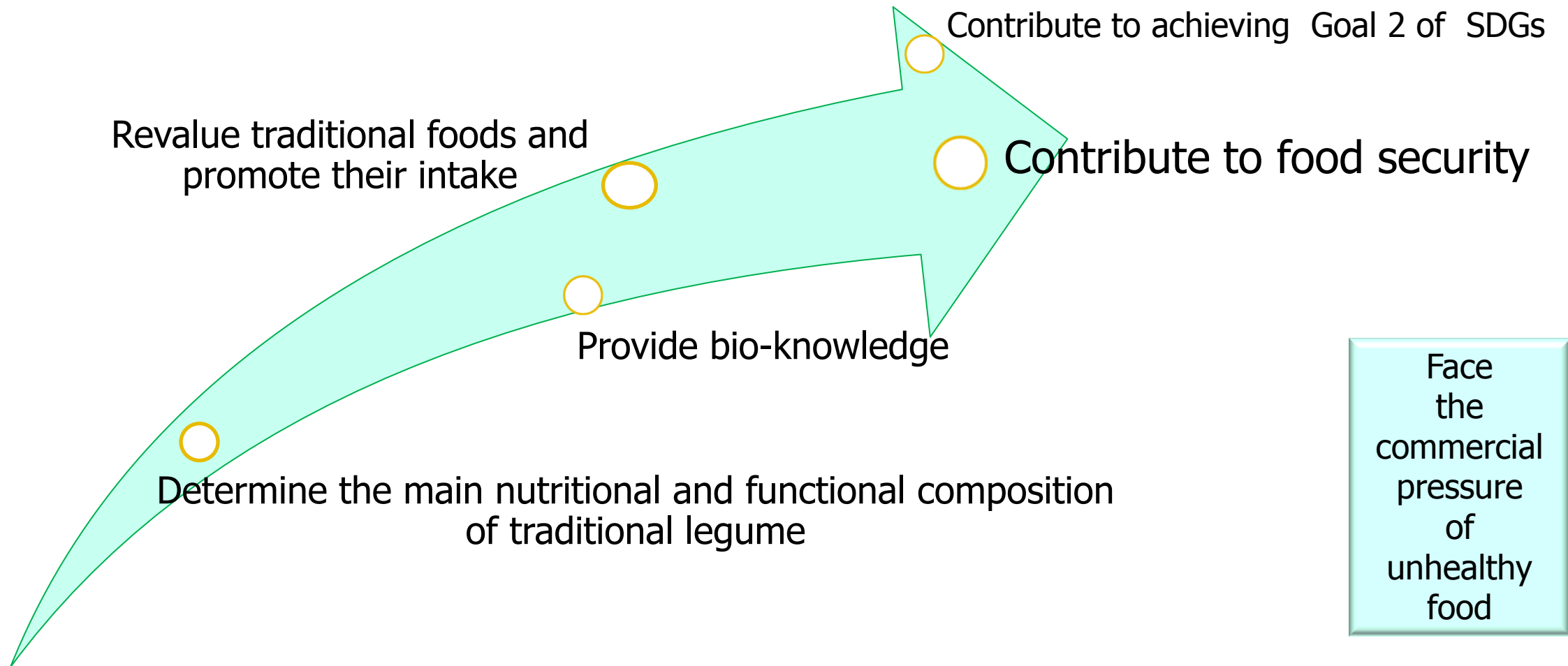
Vigna unguiculata (cowpea) and *Lablab Purpureus* L. var. sweet (lablab bean) are relatively underutilized

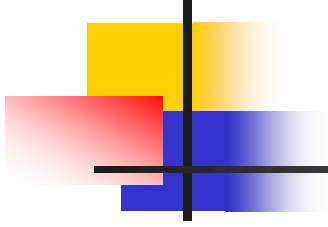
Legume:
42 g/day

Ultraprocessed:
244 g/day



Objectives





METHODOLOGY

Material



Phaseolus lunatus
(big lima bean)



Phaseolus vulgaris var. Condor
(condor bean)



Phaseolus lunatus
(baby lima bean)



Vigna unguiculata
(cowpea)



Lablab Purpureus L. var. Sweet
(lablab bean)

2016 harvest
provinces of Pichincha, Guayas and Loja

Methods

Chemical analysis

- Protein, ash, fat and moisture content were determined by AOAC methods
- Total dietary fiber (TDF) and insoluble dietary fiber (IDF) were determined following 991.43 AOAC, 32.07 AACC Lee et al., (1992) y Prosky et al., (1998) (enzymatic gravimetric method)
- Soluble dietary fiber (SDF) was calculated by subtracting the IDF proportion from the TDF

Total phenols content

- Was determined using the Folin-Ciocalteu's reagent (Singleton V. et al., 1999)

Antioxidant activity

ABTS (Re R. et al., 1995)

DPPH (Brand Willians et al., 1995)

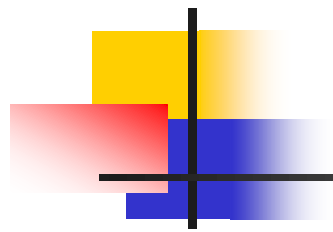
FRAP (Benzie I. and Strain J. 1996)

Each assay was carried out in triplicate



Statistically assay

- Data collected were analyzed by one-way analysis of variance with one factor (ANOVA) using Minitab 16
- The Tukey's post hoc test was applied for comparisons of means, and differences were considered significant at $p \leq 0.05$



RESULTS AND DISCUSSION

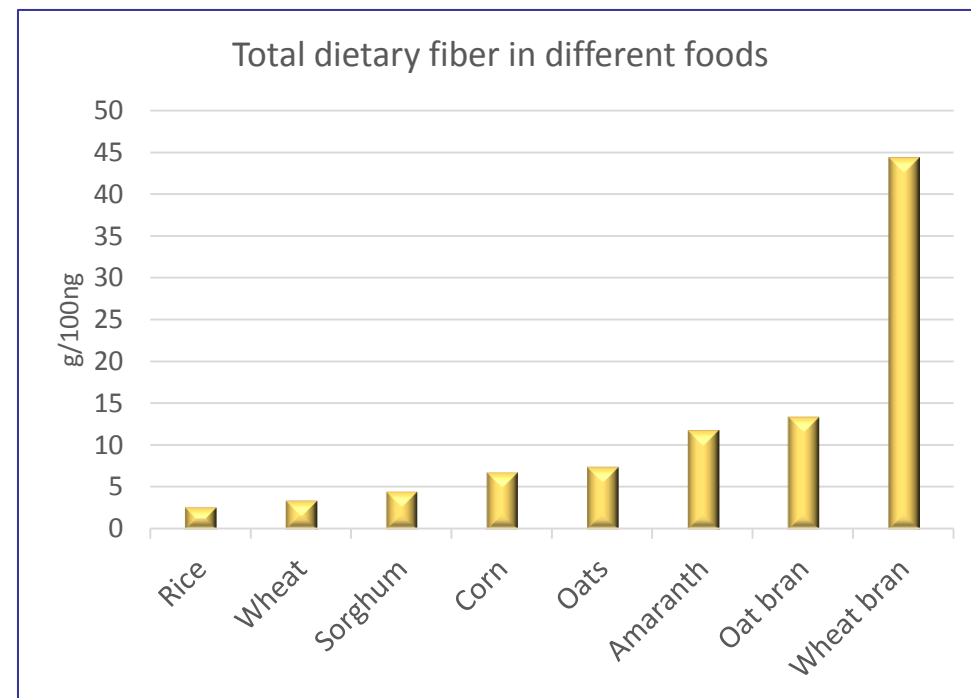
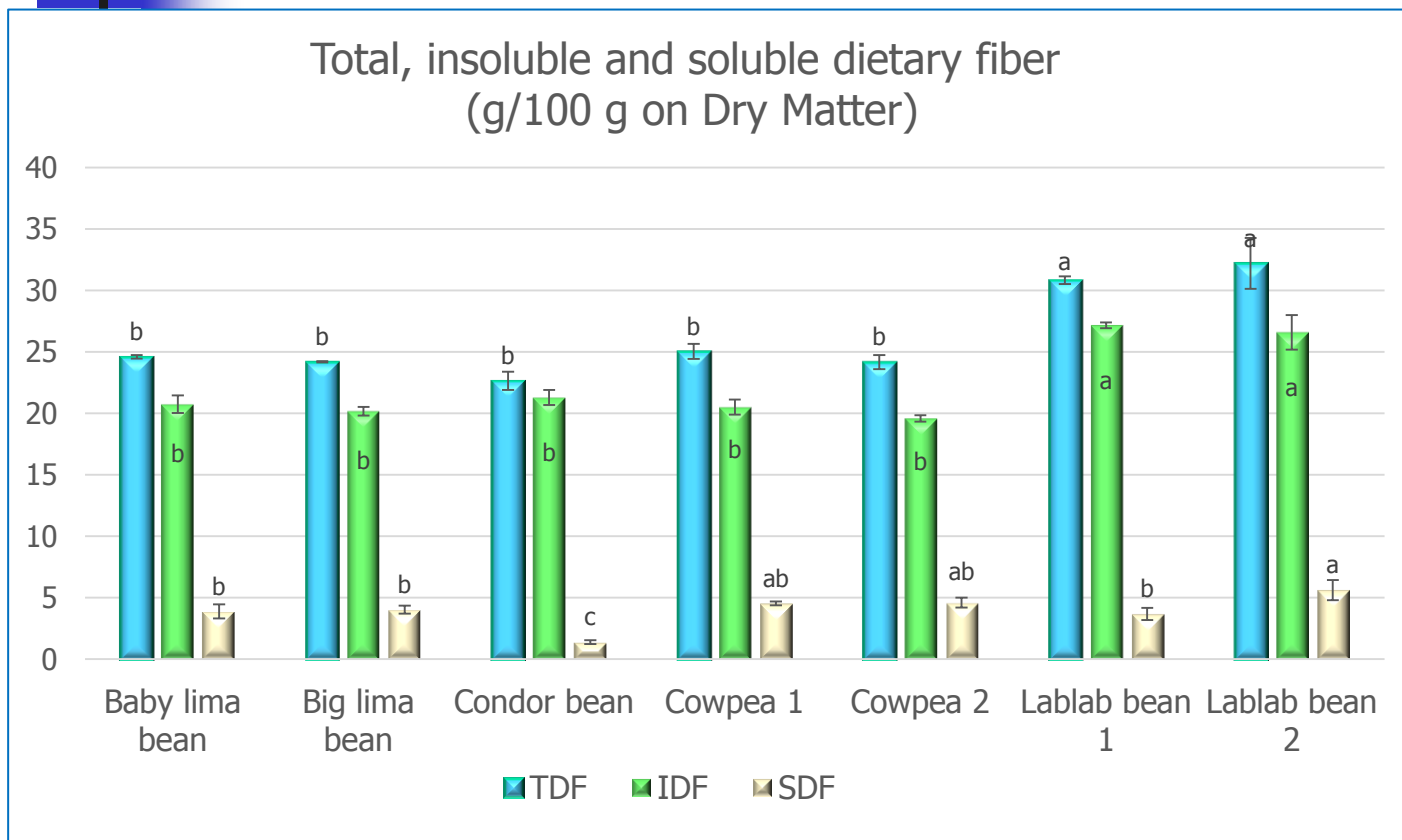
Chemical composition of legume (g/100 g on Dry Matter)

Legume	Protein	Fat	Ash	Moisture
Baby lima bean	23.26 ^c ± 0.14	1.73 ^b ± 0.12	3.93 ^a ± 1.36	8.95 ^c ± 0.14
Big lima bean	23.56 ^{bc} ± 0.08	0.96 ^d ± 0.03	4.56 ^a ± 0.04	9.71 ^b ± 0.25
Condor bean	23.23 ^c ± 0.08	4.96 ^a ± 0.07	1.31 ^b ± 0.07	7.49 ^d ± 0.05
Cowpea 1	24.26 ^{ab} ± 0.40	1.59 ^{bc} ± 0.06	3.80 ^a ± 0.19	10.60 ^a ± 0.08
Cowpea 2	23.21 ^c ± 0.13	1.47 ^c ± 0.11	4.03 ^a ± 0.07	9.04 ^c ± 0.20
Lablab bean 1	23.37 ^c ± 0.53	0.82 ^{de} ± 0.01	3.75 ^a ± 0.07	8.84 ^c ± 0.11
Lablab bean 2	24.75 ^a ± 0.05	0.69 ^e ± 0.01	3.47 ^a ± 0.01	9.25 ^c ± 0.19

1 and 2 mean:
different crops

Values followed by the different letter within the same column are significantly different ($p < 0.05$) according to Tukey's Multiple Range Test.

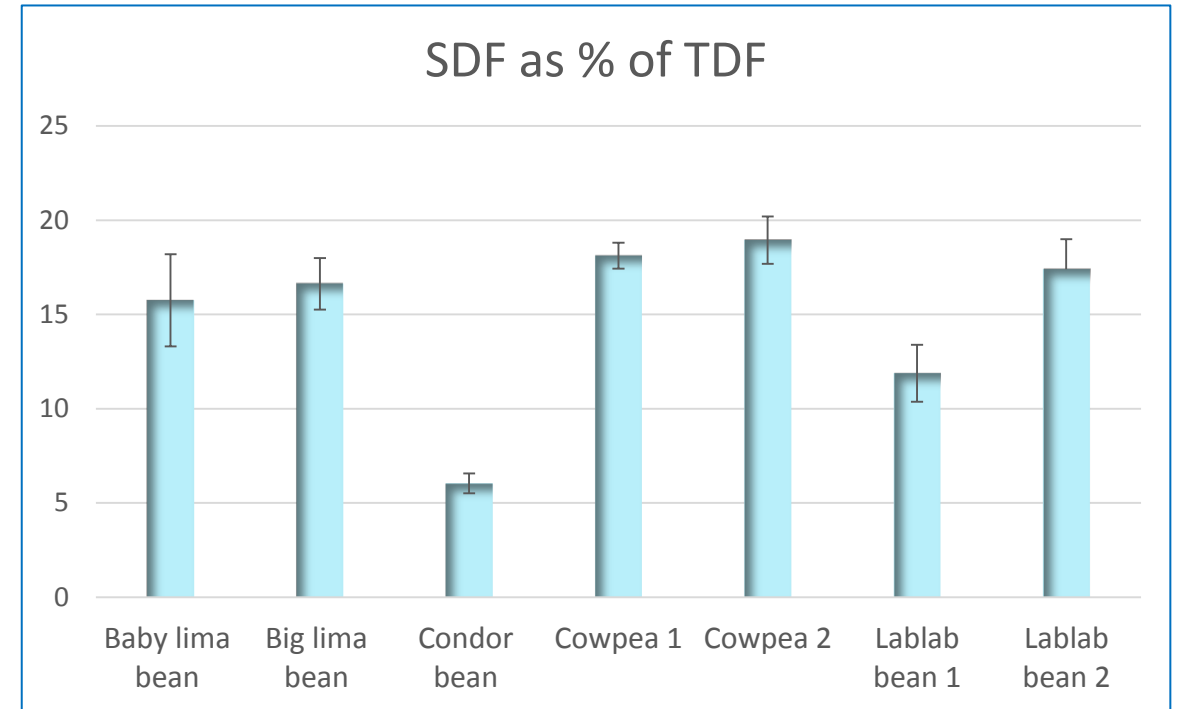
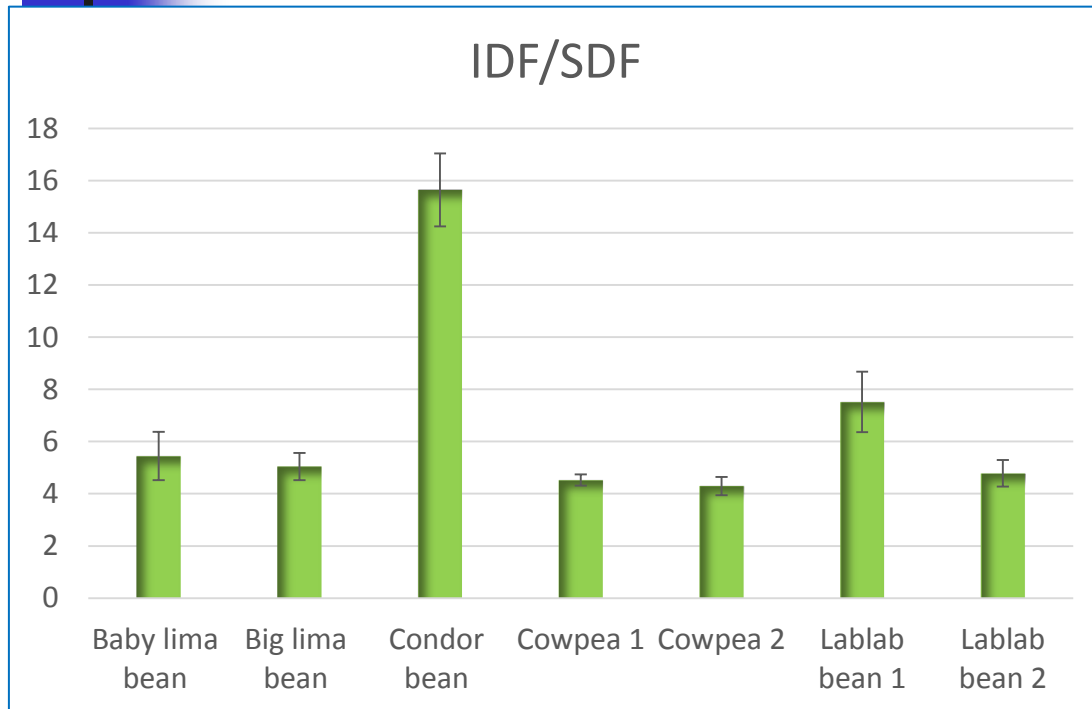
Total dietary fiber (TDF), insoluble dietary fiber (IDF), soluble dietary fiber (SDF)



(Dyner et al., 2016; Vera, 2013; Pak, 2000)

Line followed by the different letter within the same color are significantly different ($p < 0.05$) according to Tukey's Multiple Range Test.

IDF/SDF and SDF expressed as % of TDF



3:1 (IDF:SDF) intake recommended by WHO

Similar to:
Guava and sapota (16.5 %)
Pomegranate and pineapple (17.8 %)
Ramulu, P. & Rao. P., 2003

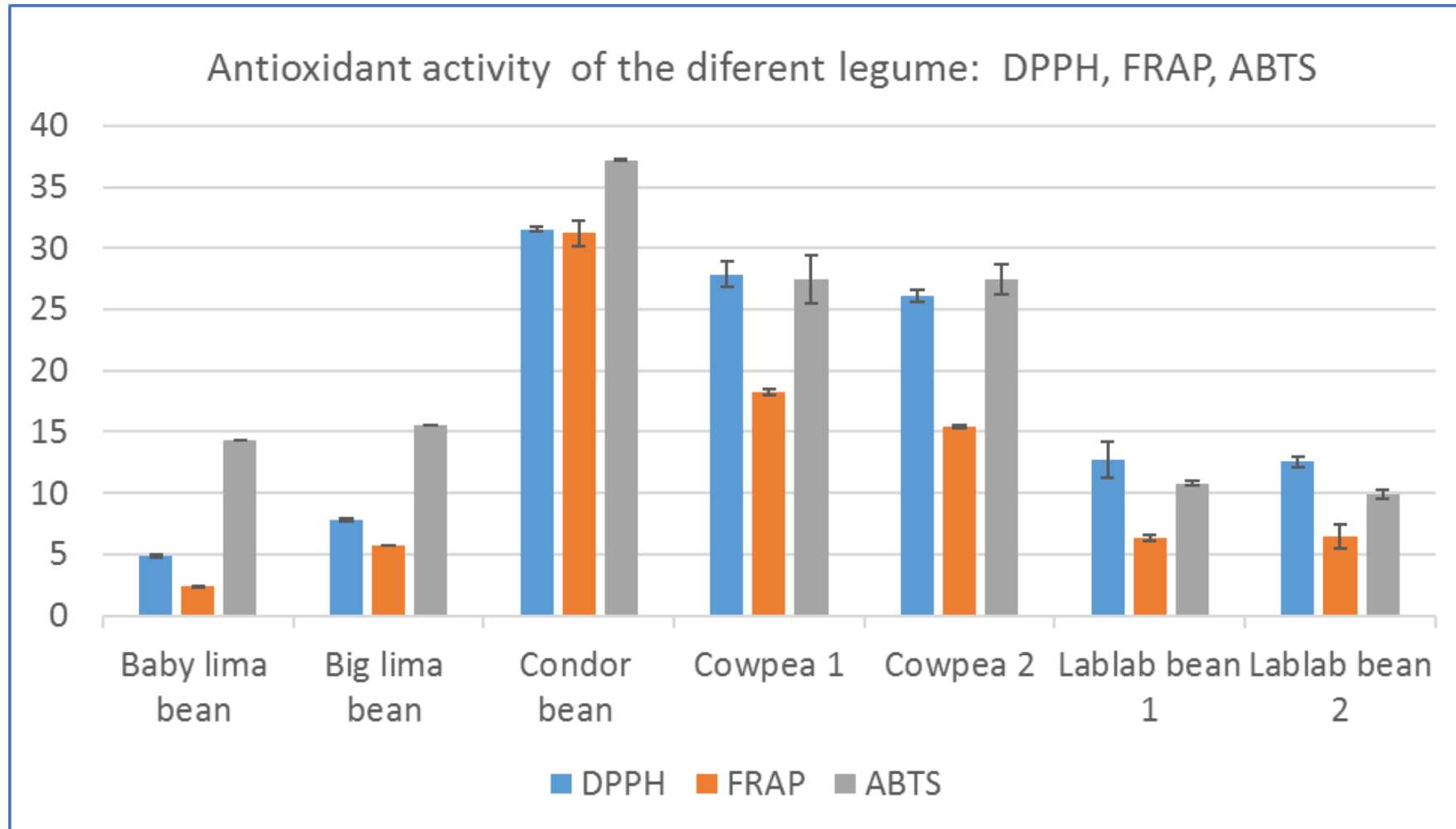
Lower than:
Mango and papaya (50%)



Total phenolic content expressed as mg gallic acid equivalent/100 g sample

Legume	Total phenolic		
Baby lima bean	182.18 ^{cd}	±	4.97
Big lima bean	276.40 ^{bc}	±	26.10
Condor bean	2229.00 ^a	±	85.90
Cowpea 1	287.72 ^b	±	5.00
Cowpea 2	256.60 ^{bc}	±	6.84
Lablab bean 1	126.31 ^d	±	11.06
Lablab bean 2	146.09 ^d	±	8.74

Antioxidant activity measured by three different test systems (DPPH, FRAP and ABTS) expressed as $\mu\text{M TE/g DM}$





CONCLUSION

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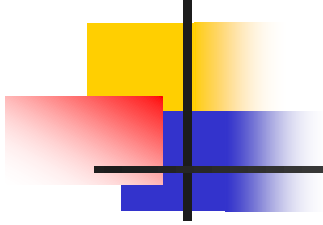


Appreciable amount of protein, total and insoluble dietary fiber were found

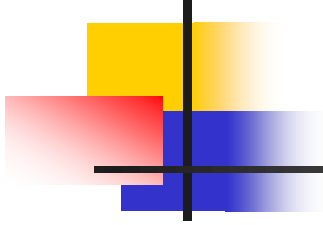
Present a moderate relation of SDF with respect to the total fiber

Have significant antioxidant activity, especially copwea and condor bean

Present a balanced nutritional contribution



Including legume
again in diet shall
contribute to ensure
the food security of
the Ecuadorian
population



Thank you



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References

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