

# ササゲ遺伝資源の子実品質関連形質の評価とデータベースの公開

## Evaluation of genetic diversity in quality-related traits of cowpea genetic resources for the development of an open access database

西アフリカの伝統的なマメ科作物であるササゲ(*Vigna unguiculata* (L.) Walp)について、育種や研究への遺伝資源の利用の活性化を目的とし、遺伝資源のもつ子実の品質や栄養価向上に資する諸形質を評価した。さらに評価した形質の多様性や各形質間の関係性についての解析を行い、ササゲ遺伝資源の子実品質関連形質(計27形質)について、各形質の遺伝的多様性の幅や特徴的な形質を有する遺伝資源を明らかにした結果、品種改良によって子実品質を向上させる可能性が示された。この研究で得られた結果をとりまとめ、検索機能付きデータベースとして公開した。

In this study, we evaluated and analyzed genetic diversity in various grain quality-related traits and relationships among the traits of cowpea, an important leguminous crop in West Africa. A wide genetic variation in the physical and nutritional properties of the grain was observed and the possibility of introgressing favorable traits utilizing identified genetic resources was suggested. Also, several improved breeding lines with various favorable agronomic and grain quality-related traits were nominated as potential parents. The obtained results were organized as an open access "EDITS-Cowpea" database (<http://www.jircas.go.jp/database/edits-cowpea>) to be utilized by all cowpea breeders for their active use of wider genetic diversity toward the development of cowpea varieties with improved nutrition and quality that meet the needs of farmers and consumers.

表1 主な農業・子実品質関連形質間の表現型相関(上部対角面)と遺伝型相関(下部対角面)  
Table 1. Phenotypic (upper diagonal) and genotypic (lower diagonal) correlations among major agronomic traits, and physical and nutritional properties

	Dflow <sup>a</sup>	Dharv <sup>b</sup>	Byield <sup>c</sup>	Gyield <sup>d</sup>	CP <sup>e</sup>	Fe	Zn	Mn	Cu	Gweight <sup>f</sup>
Dflow		0.45 *	0.30 *	0.02	0.05	0.02	-0.01	0.08 *	-0.14 *	0.08
Dharv	0.44 *		0.10 *	0.09 *	-0.10 *	-0.13 *	-0.10 *	0.15 *	0.12 *	0.44 *
Byield	0.57 *	0.19 *		0.49 *	0.22 *	0.17 *	-0.01	-0.09 *	-0.15 *	0.04
Gyield	0.10	0.32 *	0.57 *		0.07	0.03	-0.23 *	-0.05	-0.01	0.17 *
CP	0.10	-0.15	0.25 *	-0.11		0.47 *	0.36 *	-0.02	0.07	-0.19 *
Fe	0.05	-0.22 *	0.16	-0.23 *	0.70 *		0.33 *	-0.03	0.04	-0.24 *
Zn	0.00	-0.25 *	-0.07	-0.38 *	0.70 *	0.68 *		0.05	0.13 *	-0.14 *
Mn	0.24 *	0.42 *	0.32 *	0.53 *	0.13	0.04	0.18		0.19 *	0.15
Cu	-0.30 *	0.17 *	-0.27 *	0.02	0.11	0.06	0.16	0.22		0.00
Gweight	0.13	0.53 *	0.06	0.35 *	-0.28 *	-0.39 *	-0.25 *	0.07	0.00	

\* indicates  $P < 0.05$

<sup>a</sup> Dflow=Days to 50% flowering; <sup>b</sup> Dharv=Days to harvest; <sup>c</sup> Byield=Biomass yield;

<sup>d</sup> Gyield=Grain yield; <sup>e</sup> CP=Crude protein; <sup>f</sup> Gweight=100-grain weight



図1 多様なササゲ子実  
Fig. 1. Various cowpea grains

表2 ササゲの子実サイズおよび成分の詳細プロフィール

Table 2. Profile of the grain's physical, nutritional/anti-nutritional and functional properties

Traits	Average	Highest	Lowest	S.D.	Traits	Average	Highest	Lowest	S.D.
Grain size <sup>a)</sup>					Dietary fibre (g/100g) <sup>c)</sup>				
100 seed wt (g)	11.7	18.7	4.0	2.9	Insoluble	15.7	20.6	9.0	2.7
Width (mm)	5.3	6.8	3.7	0.6	Soluble	1.2	3.4	N.D.	0.9
Length (mm)	7.2	9.7	4.8	0.9	Oligosaccharide (mg/g) <sup>c)</sup>				
Protein (%) <sup>a,b)</sup>	20.4	24.1	17.0	1.3	Stachyose	31.5	43.8	24.1	3.9
Micronutrient (mg/kg) <sup>a)</sup>					Sucrose	15.4	39.3	9.2	7.8
Fe	53.1	66.3	41.4	5.0	Raffinose	3.4	4.5	1.7	0.7
Zn	39.6	47.3	32.1	2.9	Phytic acid (mg/g) <sup>c)</sup>	28.3	37.0	21.8	4.6
Mn	25.3	39.4	14.7	3.8	Polyphenol (mg/g) <sup>c)</sup>	4.4	48.8	0.1	10.7
Cu	4.8	7.3	3.4	0.7	DPPH IC <sub>50</sub> (mg/g) <sup>c)</sup>	416.7	1403.9	28.8	376.8
					Cooking time (min) <sup>c,d)</sup>	97.0	160.0	60.0	23.9

<sup>a)</sup> Data obtained in 240 genotypes

<sup>b)</sup> Calculated with N-P conversion factor of 5.45

<sup>c)</sup> Data obtained in selected 20 genotypes

<sup>d)</sup> Time to reach adequate hardness (2 - 4 N) as boiled bean

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