



Cowpea variety mixtures for optimal leaf and seed yields when intercropped with maize in Central Tanzania

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Introduction

- The multipurpose legume cowpea (*Vigna unguiculata*) is a very important source of protein and micronutrients for resource-poor farmers in Africa. Usually, leaves, grains and pods are consumed (Fig. 1).
- Unpredictable climatic conditions cause high variability in leaf and grain yields, especially in marginal environments. Most farmers need to increase their production to avoid significant shortfall of nutrient supply throughout the year.
- Variety mixtures increase the intra-specific diversity on-farm and, thereby, could contribute to both higher yield stability as well as optimal leaf and seed yields for multipurpose use of the crop.

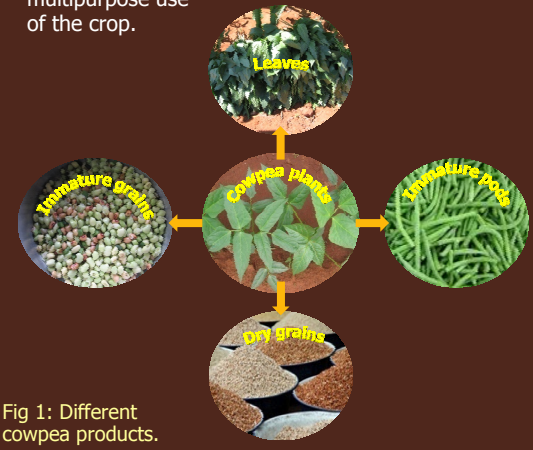


Fig 1: Different cowpea products.

Materials & Methods

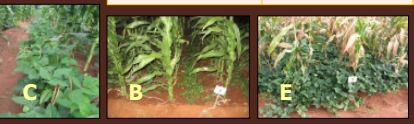
- Five cowpeas of different growth performance (Tab. 1) were selected as components to be incorporated into 15 two to five-way mixtures (Tab. 2).
- Each treatment was intercropped with maize (Situka M1).
- The trial was planted both on station and on farm.
- Three weeks after sowing, young leaves were harvested every two weeks until flowering started. Total leaf dry matter and seed yields are presented here.
- The relative effect of a particular mixture was calculated by relating its yield increase or decrease to the mean of the corresponding components.
- Local knowledge about cowpea plant types and mixtures was assessed by interviewing 50 farmers through a semi-structured questionnaire (Fig. 4).

Tab. 1: Cowpeas used as components to construct mixtures.

Component	Cowpea ID	Growing type
A	Ex-Iseke	Determinate, erect
B	UG-CP-9 (KOL42)	Indeterminate, spreading
C	Dakawa	Determinate, erect
D	IT 93K-2045-29	Semi-indet/determ., semi/erect
E	Local variety	Indeterminate, spreading

Tab. 2: Twenty treatments selected out of 31 possible ones.

Individual components	Two-way mixtures	Complex mixtures
A	AC	ABC
B	AD	ABD
C	AE	ABE
D	BC	ABCD
E	BD	ABCE
	BE	ABCDE
	CD	
	CE	
	DE	



Results

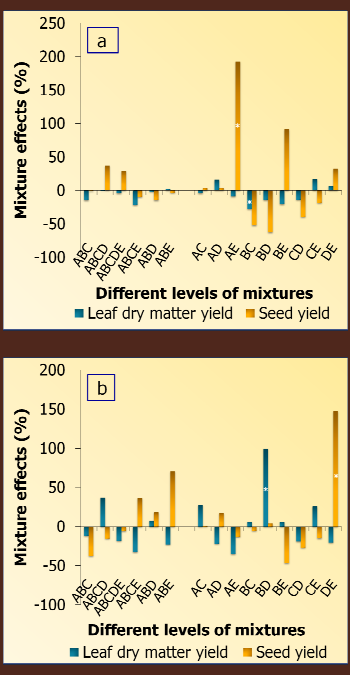


Fig. 2: Relative mixture effects of 15 different cowpea mixtures over their corresponding components in dry matter leaf yield and seed yield (a) on station and (b) on farm (significant effects marked with *).



Fig. 4: Farmers from Gawaye filling the questionnaire.

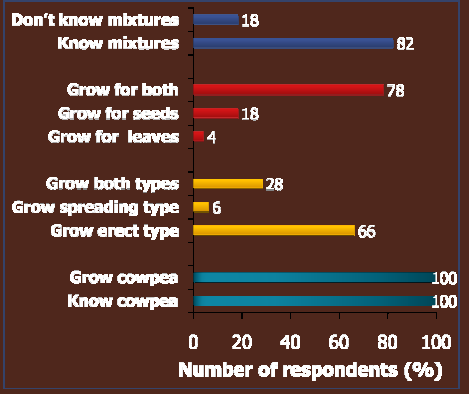


Fig. 5: Responses of 50 farmers from Gawaye village in Dodoma about cowpea and the concept of mixtures.

Results & Discussion

- Farmers appreciated variety mixtures with more emphasis on the need for reasonable supply of both leaf and seed (Fig. 5).
- Mixtures with both growing types allow smallholder farmers to increase their diversity since spreading types are rarely grown alone.
- There were no significant mixture effects on leaf or seed yields except for a few 2-way mixtures (Fig. 2), both on station and on farm.
- Complex mixtures had always low leaf yield variability, probably due to reduced Gx_E interaction (Fig. 3).

Conclusions

- Classifying cowpeas into growing types is not sufficient to predict mixture effects.
- The main advantage of higher diversity in the mixture is more leaf yield stability over time.
- Screening two-way mixtures helps identify generally favourable components for more complex ones.

Acknowledgements

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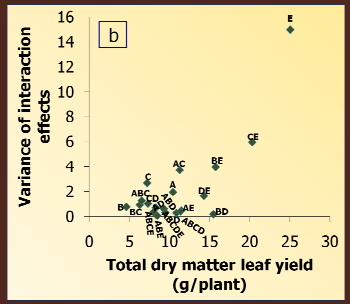
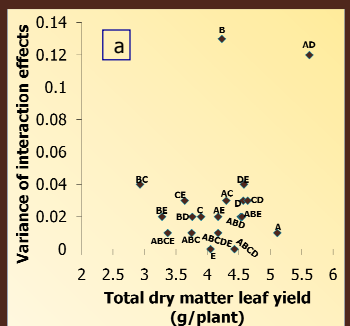


Fig. 3: Mean total dry matter leaf yields against variance of interaction effects across different harvests for all mixtures and their corresponding cowpea individual components (a) on station and (b) on farm.