

## Factsheet interim findings Applied Research Fund Call 1



### Utilizing the genome of the vegetable species *Cleome gynandra* (spider plant) for the development of improved cultivars for the West and East African markets

#### Summary

Spider plant (*Cleome gynandra*) is an indigenous leafy vegetable with strong potential for improving nutrition and health in Africa. The project aims to develop high-yielding and nutrient-rich spider plant cultivars in collaboration with farmers and consumers for introduction in vegetable markets in Benin and Kenya. The project specifically addresses the following research questions: 1) How can the intraspecific diversity of spider plant be used to improve its yield, nutritional value and resistance to drought?; 2) What are the adequate cultivation practices for optimal and sustainable production of the species?; and 3) How can researchers and value chain stakeholders efficiently collaborate for successful impact of the breeding program?

A germplasm of accessions from Africa and Asia is exploited using a genomics-assisted breeding approach and farmers and consumers are actively involved. Experiments are also conducted in order to improve the current production practices in Benin and Kenya. Traditional knowledge related to the species is documented in both countries and integrated in promotion strategies. Testing panels and farmers' field schools are also conducted to assess the acceptance of the species. New knowledge is generated and disseminated through partnership with farmers' associations, national agricultural research systems, supermarkets and restaurants. Upscaling cultivation of *Cleome gynandra* in urban and peri-urban areas will provide an additional source of income for farmers and seed companies and a source of health-beneficial compounds for consumers.

#### Interim Research Findings

1. Spider plant is a very important species for local communities in Benin and Kenya which contributes to livelihoods and diets but is also used as a medicinal plant.
2. In communities where the species became rare, farmers are willing to start cultivating it if they are given the appropriate training and planting materials.
3. The species is easily self- and cross-pollinated which provide several options for cultivar development.
4. Farmers were given the opportunity to assess the morphological variation in the species in terms of leaf area, number of leaves and branching patterns and clearly formulate their preferences. In Benin, 3 accessions were adopted in market gardening systems. One accession was preferred for its potential medicinal value based on the strong odour of the leaves. The two others were selected for home consumption.
5. The species rich in vitamins (e.g. provitamin A, vitamin C) and other health-promoting compounds (e.g. glucosinolates, flavonoids) have a wide variation among accessions which gives room for selection for highly nutritious lines.

#### Outcomes achieved

In Benin, spider plant was known by several rural communities as a medicinal and food plant. The Adja communities in the southern region of the country use to cultivate and sell the species in their local markets. However, in urban areas the species was less known. With the project, 20 farmers in urban and peri-urban areas started cultivating the spider plant and the demand in the species is increasing. In addition, it is now included in the diet of more than 200 urban households

which are part of the Community-Supported Agriculture system established by the NGO Hortitechs Development and a network of farmers. Some local food enterprises including Agridynamic and Sahel Ltd. are interested in processing the leaves.

## Messages to

### A) Actors from private sector:

- There are several business opportunities to seize in the field of valorisation of indigenous African species. The processing of African leafy vegetables which are nutritious but highly perishable, such as spider plant, is still an underdeveloped sector.

### B) Civil society and practitioners organizations:

- The main actors of breeding programs and their preferences currently guide the research processes. It is advised to collaborate freely with researchers and actively participate in the research in order to fully benefit from the outcomes.
- Participate in the promotion of local crops to contribute to achieving food and nutrition security.

### C) Policy makers:

- Promotion of indigenous species for diet diversification and improved livelihoods should be supported by national and international policy makers not only in terms of funding but also through facilitation of knowledge dissemination and exchange as well as farmers' capacity strengthening.

## Knowledge products

- [Leaflet "Contribution of spider plant home gardens to household food security and income in Southern Benin", August 2017](#)
- [Leaflet "Introduction of spider plant in urban and peri-urban vegetable production systems in Benin", August 2017](#)
- [Technical leaflet "Best agricultural practices for the cultivation of spider plant", August 2017](#)
- [Presentation of the project at the ARF country workshop in Cotonou, Benin \(October 29, 2016\) entitled Approach for improving cultivars of spider plant for Africa: Reaching the ultimate target group.](#)
- [The project poster, October, 2016](#)

## Knowledge networks

The project is conducted by a network of researchers (Wageningen University, African Orphan Crops Consortium and World Vegetable Center), farmers and consumers in Benin and Kenya respectively collaborating with the NGO Hortitechs Development and the Kenyan Centre for Indigenous Knowledge (KENRIK). The project members contributed to setting up the African training and research mobility program MoBreed focused on African orphan crops breeding. The program was launched in June 2017 and include five African universities. One MSc and two PhD will conduct their research on spider plant breeding within the program.

## Co-creation

The project is based on a multi-stakeholders approach for knowledge generation and dissemination. End-users of developed spider plant cultivars including farmers, consumers and vendors were involved at the early stages of the project and actively participated to the definition of the product target (high-yielding and late flowering cultivars with regrowth capacity after cutting). During germplasm characterization, farmers and consumers were invited to assess the variability observed on-farm and re-define the breeding objectives. At that step they also put emphasis on other criteria related to taste and odour of the leaves. Farmers are actively working for promotion of the species in urban and peri-urban vegetable production in Benin and Kenya. Evaluation of the outputs of the project will be evaluated with these stakeholders.

Activities planned for the last semester of the project include the publication of our results in peer-reviewed journals and their dissemination through outreach activities in Benin and Kenya, especially promotion activities in supermarkets and restaurants. Other research activities to be conducted include multi-environmental evaluation of the selected spider plant lines, development of seed storage, conservation and germination protocols for breeding programmes and farmers.

## Consortium Partners

- [NGO Hortitechs Developpement - Benin](#)
- [Faculty of Agronomic Sciences, University of Abomey-Calavi - Benin](#)
- [Kenyan Centre for Indigenous Knowledge \(KENRIK\) - Kenya](#)
- [Wageningen University and Research - The Netherlands](#)
- [African Orphan Crops Consortium - Kenya](#)
- [World Vegetable Center \(AVRDC\) - Taiwan](#)

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## Project website

[F&BKP Research Project page](#)