HORTINLEA
DIVERSIFYING FOOD SYSTEMS

"Diversifying Food Systems: Horticultural Innovations and Learning for Improved Nutrition and Livelihood in East Africa" (HORTINLEA)

JOINT INTERIM REPORT (SP6)

01/01/2014 – 31/12/2014

FORMAL REPORT

Description of activities/milestones
SP6: Variety development and seed systems
S 1.1. Development of a multiplex marker set for genetic diversity studies.
S 2.1. Ploidy levels of selected plant material of all three species are known.
S 3.1. The seed of at least 10 elite lines of each crop will be increased at AVRDC-RCA to provide sufficient quantities for trials on other subprojects in target countries
S 3.2. Multi-environment and on-farm testing of available elite lines indifferent agroecologies
S 3.3. Evaluation, selection and profiling of germ plasm material forresistance or tolerance to major biotic and abiotic stresses

Under activity **S1** “Analysis of genetic diversity of African nightshades, spider plant and cowpea” methods for DNA-extraction were adapted to African nightshades and spider plant and DNA extracted from 5 individuals of five accessions each for both spider plant and African nightshade. PCR primers for SSR analysis in two species have been developed by bioinformatics approaches conducted on published sequences and primer pairs tested for PCR performance in replicate experiments. AFLP reaction conditions and primer combinations were tested on DNA of spider plants and African nightshade in replicate experiments to analyse the reliability of the method. AFLP- and SSR markers for individual plants of five accessions were analysed. High levels of variability were found within and between accessions of spider plant, very low levels of variability found for African nightshades. First DNAs were extracted from additional seed lots for further genetic analyses. Under activity **S2** “Cytological and molecular studies of flowering and reproduction” methods for ploidy determination and pollen viability were optimised on spider plant and African nightshade. Ploidy determinations were started for spider plant and African nightshades on five accessions each via flow cytometry, and cytology. Mostly hexaploid genotypes have been identified in African nightshades also diploid genotypes have been identified for spider plant. Additionally, a Method has been established for chromosome counts in spider plants via the “steam drop method”. Pollen viability tests for both species indicated high average fertility with clear variability between accessions. First analyses of self-incompatibility were performed via hand pollination on greenhouse plants and self compatibility was found for both species. Measures for agronomical traits (plant height, days to flowering, fresh mass, dry mass) were completed for five accessions. Variability within accessions was low for African nightshades, higher for spider plant. There was a clear variability between accessions visible for both species. In addition to the greenhouse experiments in Hannover, field experiments on morphological characteristics of 30 additional accessions of African Nightshade have been conducted in Kenia for African Nigthshade, starting in December 2014. Under activity **S3** “Variety development and improvement” seeds of elite lines were increased for African nightshade, spider plant and cowpea as well as Ethiopian mustard. A total of 37 accessions of African nightshade were planted for further seed increase around 7 kg of seed was produced for each accession. Multiple accessions for both African nightshade and spider plant were distributed to HUB, LUH and JKUAT. In addition Brassica carinata "Arumeru" and one variety of Amaranth were distributed to other subprojects. A total of 288 African nightshade and 255 spider plant pure lines are currently characterised for resistance or tolerance to major biotic and abiotic stresses. High variability was detected among the accessions for earliness, vegetative yield and other traits. Further pure lines for

African nightshade, spider plant and cowpea were developed by single plant selection. Within the framework of **S4** “Seed harvesting processing and quality” a collection of germplasm from seven counties in western Kenya and North Rift was made for spider plant, African nighthshade, Amaranth, jute mallow, African cale and cowpea by searching farmers fields, traders collections, open markets, agrovets and private companies. Evaluation of the germplasm started for basic agronomical characteristics on field plots of JKUAT. In September 2014 another collection trip was conducted to several places in Western Kenya to collect additional accessions. Furthermore valuable information about varieties under use, cultivation practices and seed multiplication was obtained from farmers and agrovets.