

Project “Collection, Characterization and EVALuation of wild and cultivated BRASica

Partners

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Duration 12 months

Background and Justification

Di3A will sow 25 landraces and 5 commercial cultivars of *B oleracea* vegetable crops and 10 wild Brassica (n=9) accessions selected among the European ex situ *Brassica* collections on the basis of the availability for using them in the frame of AEGIS, which means offered by the European genebanks and Institute holders, of the geographic origin, and of the expression of specific bio-morphological, biochemical and genetic traits already known by all the project partners in view to characterize them for bio-morphological, biochemical and genetic traits utilizing the same descriptors utilized for the VIII ECPGR phase project of the BWG. The DNA extracted will be used to characterize them by 10 SSR primers related to glucosinolate biosynthesis pathway. The freeze dried samples of leaves/produce will be analyzed by Di3A for GLS and PHP profile, whereas freeze dried samples As concerns with evaluation for the antioxidant content and capacity of the leaves of the accessions grown in Catania and in Braga, the freeze dried samples sent by Di3A and BPGV INIAV will be analyzed by CRA IAA for PHP and AC, by CSIC Cordoba and by UNIVR for GLS profile. At Braga will be established with the same accessions growing at Catania for which we have enough seeds available adopting the same growing methods and techniques of Di3A characterization field. BPGV INIAV will characterize the 40 plant per accession for the same bio-morphological utilized for the VIII ECPGR phase project of the BWG. The DNA extracted from the plants growing in Catania and in Braga will be used to characterize the 40 accession grown in Catania and in Braga will be conserved at -80°C in view to prepare the freeze dried samples. Di3A and UTAD will send to other research units to complete the biochemical analyses. The freeze dried samples of the leaves of the accessions grown in Braga will be sent for their analysis to Di3A for GLS and PHP profile, to CRA IAA for polyphenol profile and antioxidant capacity, to CSIC Cordoba and to UNIVR for GLS profile. INIAV Oeiras will evaluate 40 and in controlled environmental conditions (plantlets grown in containers) for downy mildew (*Hyaloperonospora brassicae*) resistance whereas Di3A will evaluate the 30 accessions for Black rot (*Xanthomonas campestris pv campestris*).

Description of the work

The activities carried out by the Brassica Working Group (BWG) during the VIII ECPGR phase achieved results of interest about the diversity expressed by the wild *Brassica* relatives (n=9) and the *B. rapa* accessions characterized, conserved in several European gene banks. On the basis of the previous results obtained and of the AEGIS priority actions focalized at the last BWG meeting of Linguaglossa (2010) is of great interest to continue the characterization work till now carried out for *Brassica* wild relatives (n=9), to integrate some gaps in the *Brassica* collection for some taxa diffused in the east Mediterranean basin, to individuate source of resistance for downy mildew (*Hyaloperonospora brassicae*) and for black rot (*Xanthomonas campestris* pv *campestris*) disease, and to regenerate them in view to increase the seeds amount available for the users. In addition is of interest to evaluate. The main characterization field will be established at the experimental farm of Catania University where 40 landraces of *B. oleracea* crops diffused in Europe will be compared with 10 commercial cultivars (F1) and with 10 wild *Brassica* (n=9) accessions for the main bio-morphological descriptors and the data registered with those registered in the characterization field established at Braga will be grown the same accessions utilized by Di3A. The criteria for selecting accessions among the European ex situ Brassica collections are the availability for using them in the frame of AEGIS offered by the holders, the geographic origin, and the expression of specific bio-morphological, biochemical and genetic traits already known which contribute to diversify the set of landraces and CWRs characterized and evaluated and to render them available for the users. All wild Brassica relatives will be regenerated by Di3A in Catania where the environmental conditions are good for their growing and regeneration as ascertained in the frame of the previous BWG project of VIII ECPGR phase. For each accession will be transplanted 40 plants. 10 leaf samples will be collected for single plant in the juvenile phase after 60 days from transplanting in view to extract DNA whereas two replication of 10 samples of the produce harvested in bulk will be freeze dried in view to send samples to the other research units for biochemical analysis (total polyphenols and polyphenol profiles, individual and total glucosinolates and their profiles, antioxidant capacity, etc.). In the other characterization field located in Braga will be extract DNA by BPGV INIAV for 10 plants per accessions. At the same time will be collected 3 replicates of the produce of 10 plants bulked to freeze-dry and send them to the research units involved in antioxidant characterization. DNA will be analyzed by Di3A by 10 SSR strictly related to the gene involved in glucosinolate metabolic pathway in *B. oleracea* whereas BPGV INIAV will analyzed the 30 accessions by 40 SSR to improve Brassica database and the SSR chosen with linkage to C5 and C9. As concerns with evaluation for the antioxidant content and capacity of the leaves/produce of the accessions grown in Catania and in Braga, the freeze dried samples sent by Di3A and BPGV INIAV will be analyzed by CRA IAA for polyphenol (PHP) profile and antioxidant capacity (AC), by CSIC Cordoba and by UNIVR for glucosinolate (GLS) profile, by Di3A for PHP and GLS profile. INIAV Oeiras will evaluate 30 in controlled environmental conditions (plantlets grown in containers) for downy mildew (*Hyaloperonospora brassicae*) resistance whereas will evaluate the behavior of 40 accessions to the biotic stress and in controlled conditions for Black rot (*Xanthomonas campestris* pv *campestris*).

The activities were started outside of this agreement and before its signature. This agreement will cover those activities that are meant to obtain the following list of outputs:

- 1) Analysis of glucosinolate content and composition of 40 freeze-dried leaf samples provided by Di3A and BPGV INIAV. The glucosinolate composition of the samples will be obtained by following the official reference method of the European Community (ISO 9167-1; EEC 1990);
- 2) Analysis of GLS, PHP, AC profiles of 80 freeze-dried leaf samples provided by Di3A and BPGV to the research groups involved in biochemical analysis;
- 3) Evaluation of the analyzed accessions for downy mildew and for black rot disease;
- 4) Provide of glucosinolate composition data to AEGIS database;
- 5) Preparation of a scientific publication on the results of this project, in collaboration with others research groups participating in the project.

OBJECTIVE (outcomes, outputs, activities to which this activity contributes)

- Accessions of AEGIS to characterize and evaluate by establishment of proper documentation of AEGIS accessions
- Identification of eligible accessions to be proposed for registration as AEGIS accession
- Services for characterization, evaluation and/or phenotyping of AEGIS accessions
- All accessions analyzed will be inserted in the AEGIS accessions provided by AMs
- Safety duplication facilities for AEGIS accessions offered to AMs
- Collaboration between NFPs and collection-holding institutes strengthened
- Survey of user needs performed and results analyzed
- Effective services to users established
- Closer link with the conservationists and breeders realized
- Research partnerships established between genebanks and researchers, including through EU projects