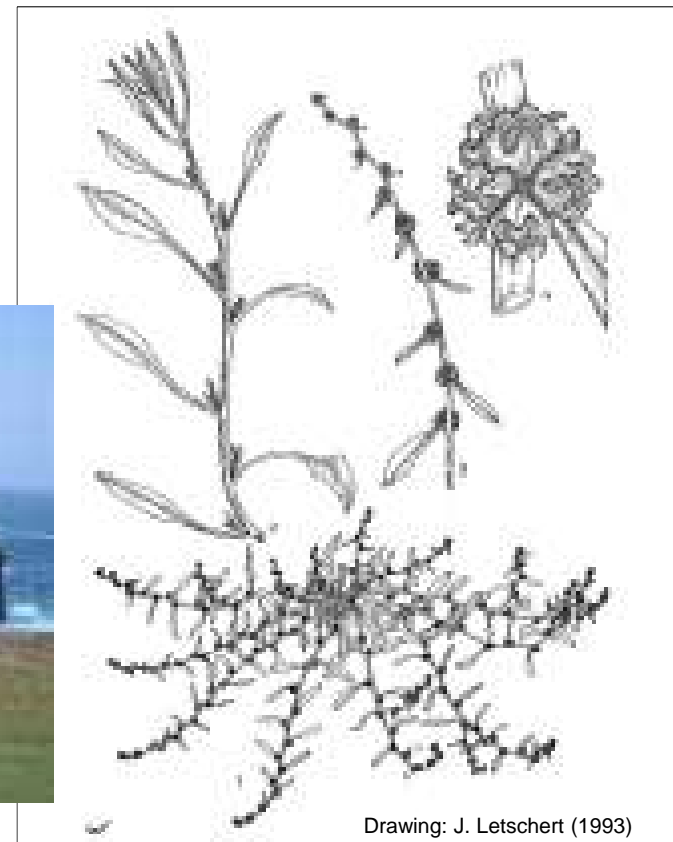


Beta patula Ait. genetic diversity analysis

Presented by Lothar Frese

Institute for Breeding Research on Agricultural Crops
Quedlinburg, Germany

Co-authors: M. Nachtigall, M. Pinheiro de Carvalho, M. Enders



Drawing: J. Letschert (1993)

Beta patula Ait. genetic diversity analysis



Strategy 3, monographic approach (Maxted & Kell, 2008)

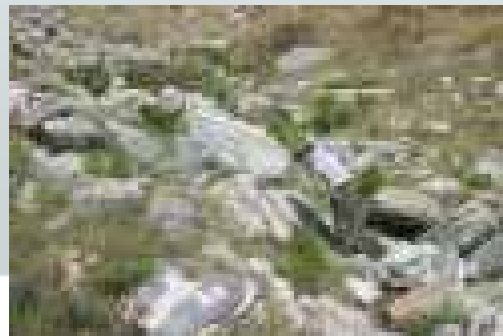
Specific crops and their CWR, global priorities and network of GR in (protected) areas

e.g. Azerbaijan
Beta lomatogona, Talysch mountain

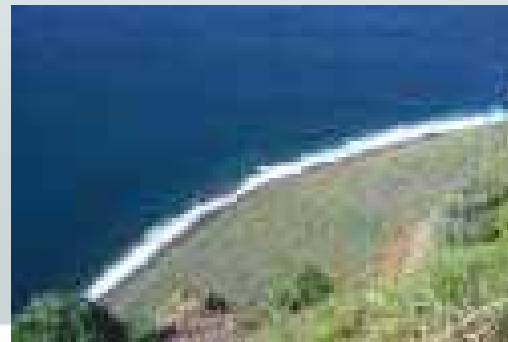


Greece

See poster: Ecogeographic survey of *Beta nana* – an International Cooperative Effort



Portugal



Germany



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Application of the four steps methodology

Taxon delineation and selection of target taxa: UMa and JKI

Ecogeographic diversity analysis
 – climate, soil, census: UMa
 – **genetic analysis: JKI**

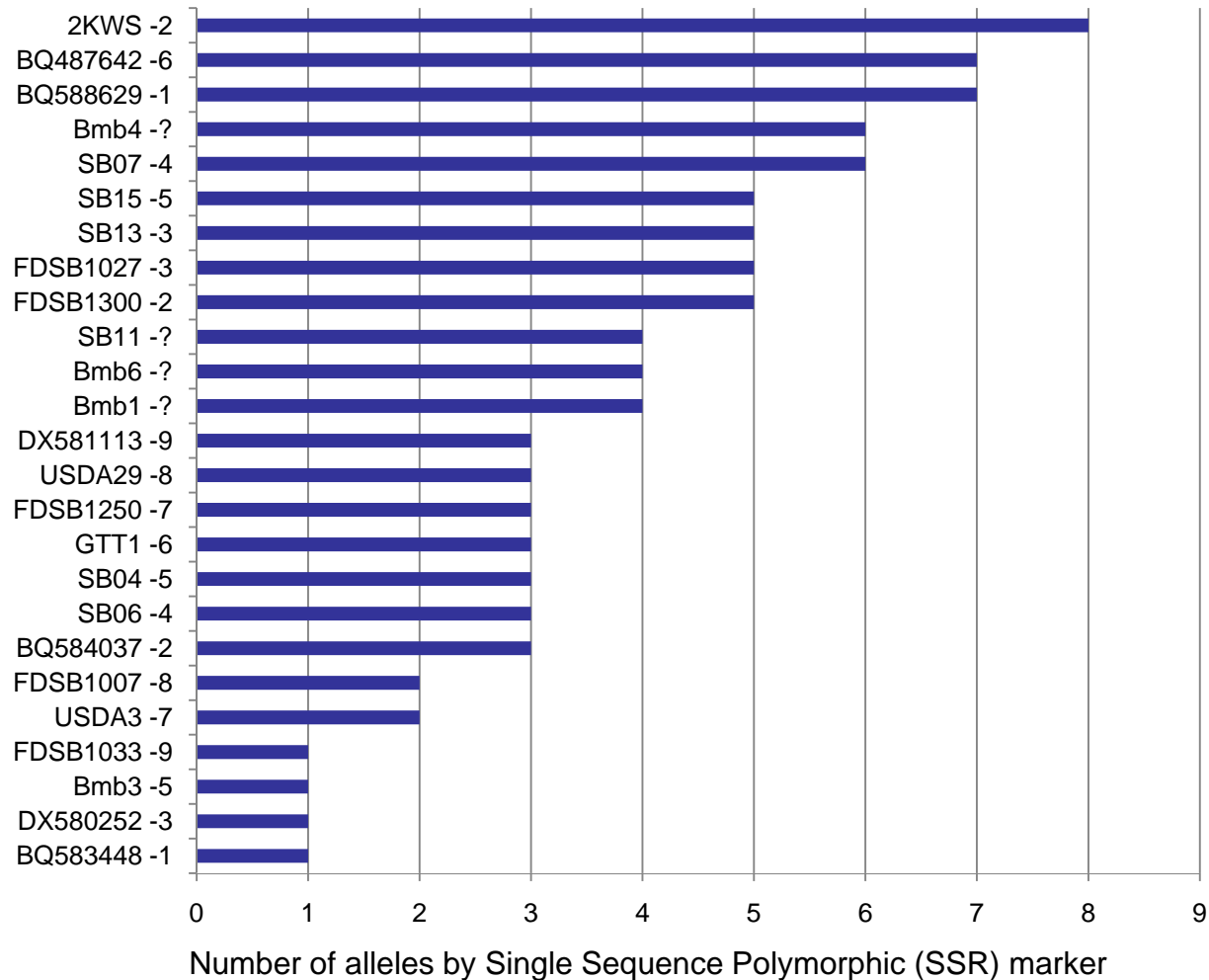
Selection of target sites: UMa and JKI

Establishment of a genetic reserve:
 PNM

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Case study Beta. Step 3 (ecogeographic – genetic analysis)



242 individual were analysed

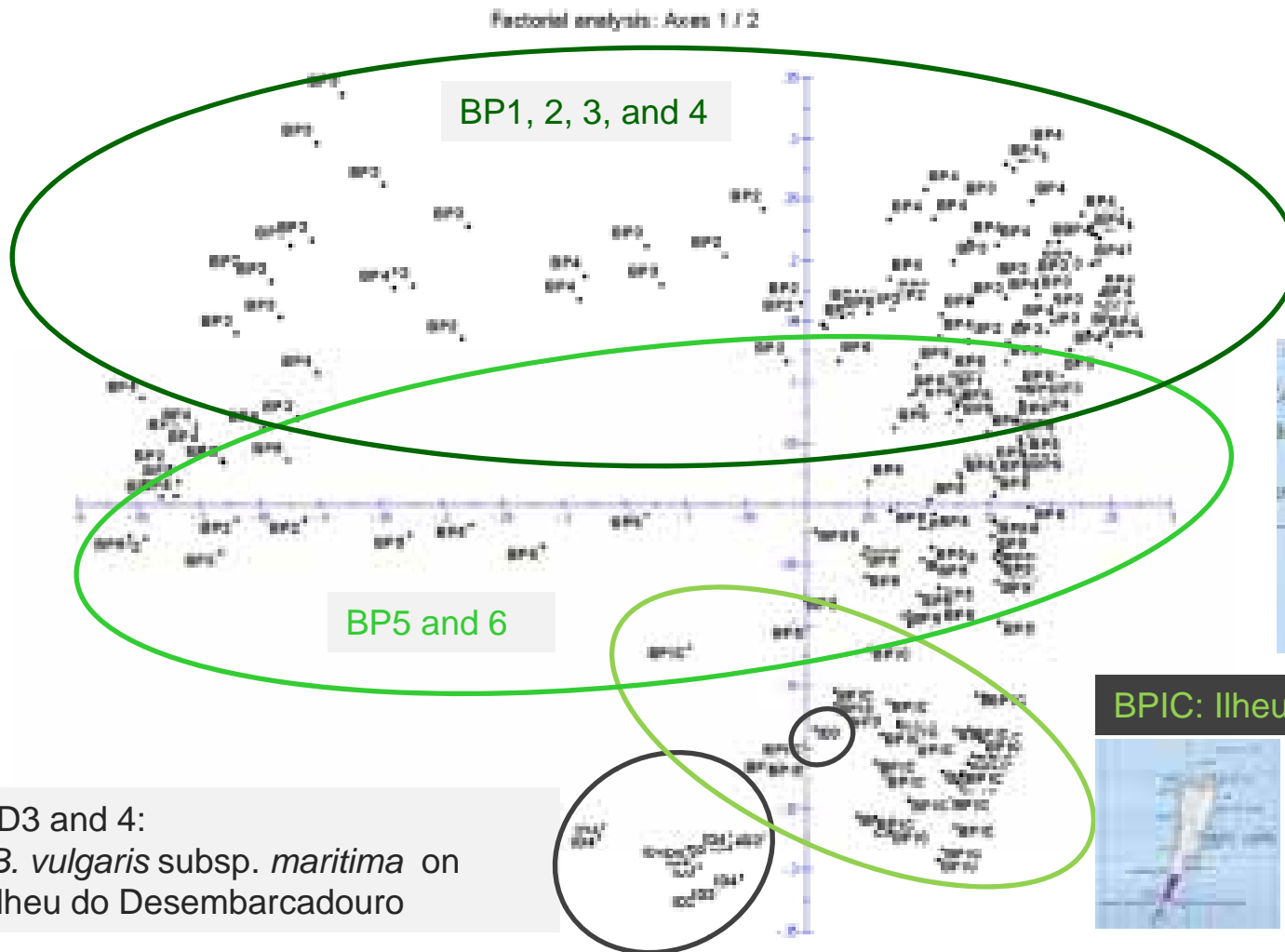
1= not amplified in *B. patula*.

2= monomorphic marker

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Case study Beta. Step 3

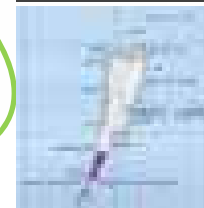


BP= *B. patula*

Axes 1 and 2 explain 42,5 % of the variance



BPIC: Ilheu Chão



ID3 and 4:
B. vulgaris subsp. *maritima* on
Ilheu do Desembarcadouro

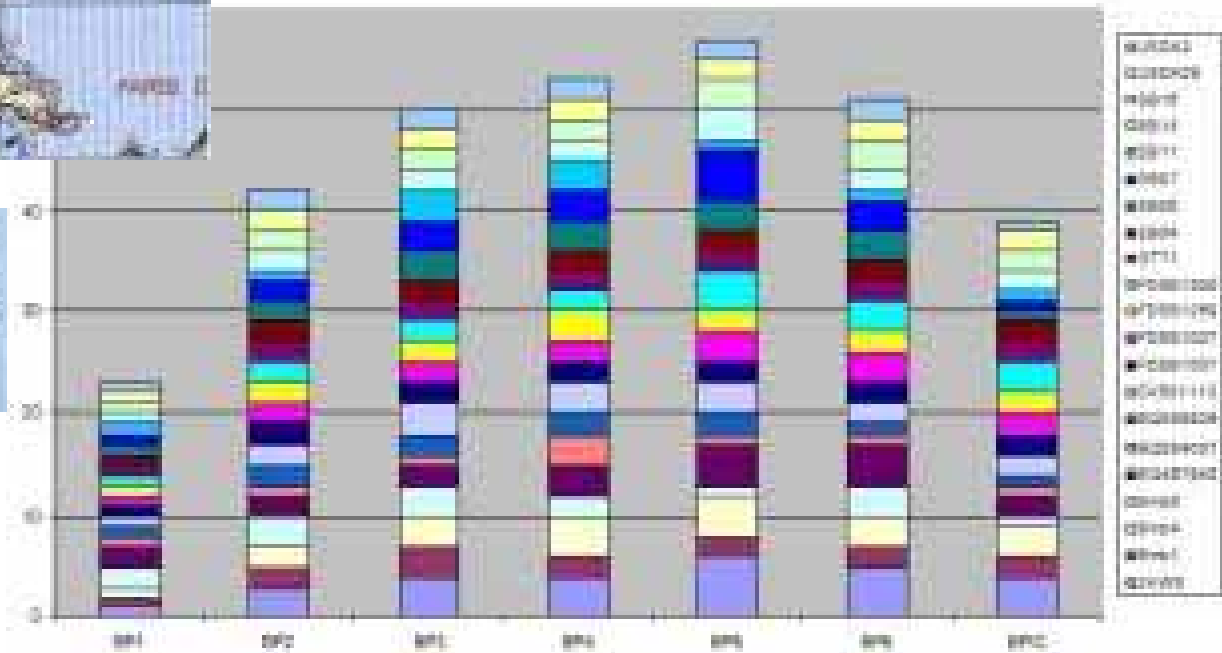
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Case study Beta. Step 4 (selection of target site)



46 to 48 plants per patch analysed



Number of alleles in *B. patula* patches

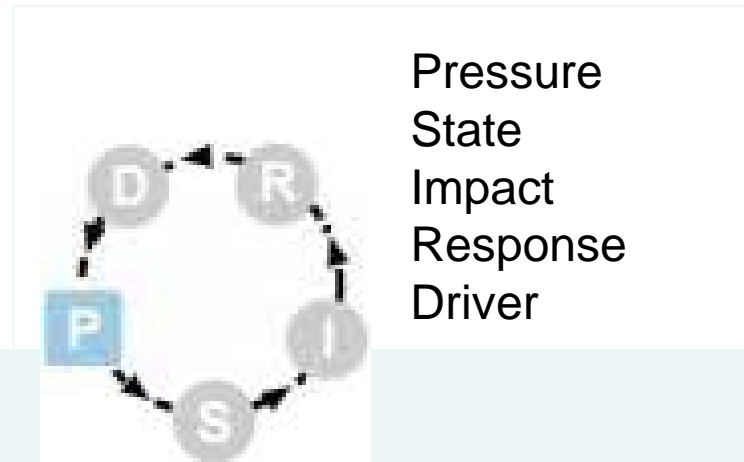
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Case study Beta. Step 5 (Establishment, management, monitoring)

Monitoring

- Demographic: Traits easy to record
- Genetic: More expensive
- Rare, critically endangered! A very good reasons for genetic monitoring?



Mechanisms of a genetic system:
Organisation (Chromosomes, ...)

Expression

Reproduction

Combination (Meiosis, mating system) and **spatio-temporal dispersal of genetic information.**

Source: H.-R. Gregorius

***Beta patula* Ait. genetic diversity analysis**



Monitoring

Demographic

Genetic monitoring describes the state and development of **genetic systems** by means of criteria, indicators, and verifiers (test values/statistics)

Criteria

describe the essential elements of a system

Indicators

indicate the state of a system with respect to its integrity

Verifier

are used to confirm assumptions on the state of a system deduced from indicators

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Case study Beta. Step 5. Genetic monitoring (after Gregorius & Degen, 2007)

Indicators for unaffected genetic processes

Processes	Indicators			
	Level of genetic variation is maintained	No directional change in gene and genotypic frequencies	No change of the mating system	No change in migration
Genetic drift				
Direct selection				
Indirect selection				
Mating system				
Gene flow				


= no influence, system unaffected

Beta patula Ait. genetic diversity analysis



Case study Beta. Step 5. Genetic monitoring (after Gregorius & Degen, 2007)

Test values of indicators of genetic processes (for discussion - Beta patula)



Indicators	Verifiers				
	1	2	3	4	5
Level of genetic variation	Genetic diversity, % polymorphic loci	-	Genetic variation of adaptive traits	Fixation indices	Number of juveniles
Directional change in gene and genotypic frequencies	Significant change trends in genotype frequencies	Significant change trends in phenotype frequencies	Differences in cohort distribution	-	-
Mating system	Outcrossing rates	Sexual system	Pollen production	Patch size and distance	Germination capacity
Migration	Extent of genetic differentiation between occurrences	Pollen dispersal	-	Isolation barriers	-

***Beta patula* Ait. genetic diversity analysis**



Case study Beta. Step 5.

If a decision is taken to set up a genetic monitoring program then a

sampling strategy

sampling procedure

analytical standard methods for traits (correlated with adaptability)

documentation procedure

data analysis procedures and a

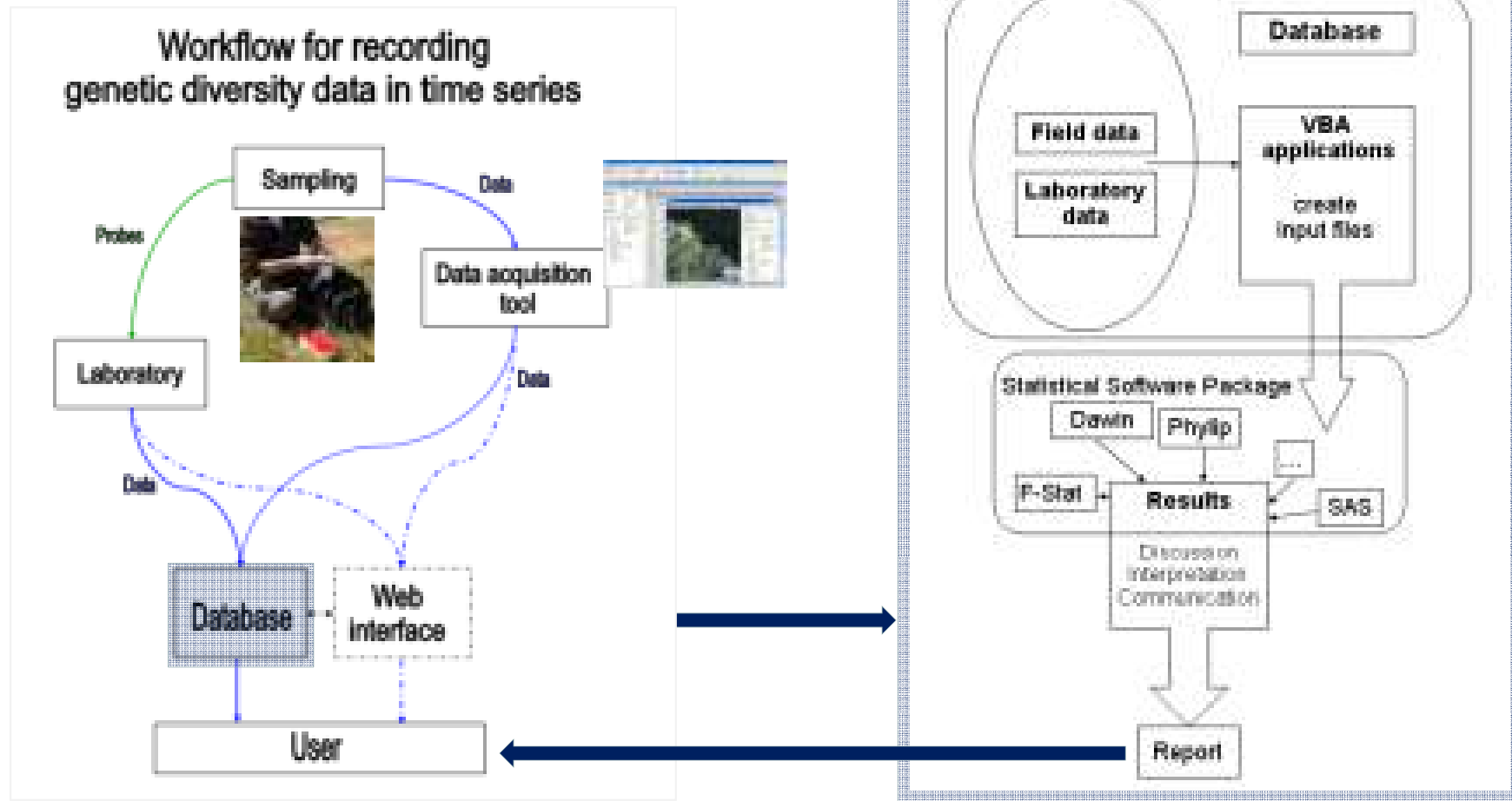
data repository for long-term data storage

is required.

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Case study Beta. Step 5.



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Summary

Results of the diversity analysis

Discussion of site selection

Schema for genetic monitoring

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Acknowledgements

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“An integrated European in situ management work plan: implementing genetic reserve and on farm concepts”
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Thank you for your attention!