

Botanic Gardens Conservation International
The world's largest plant conservation network



BGCI

Plants for the Planet

Module 3: Seed Collection





BGCI

Plants for the Planet

- Sampling strategy
- Handling
- Field data
- Herbarium voucher
- Post harvest handling



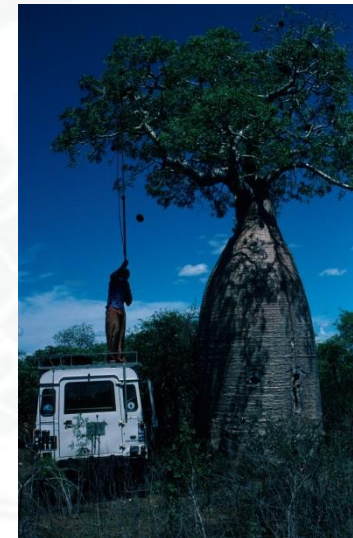
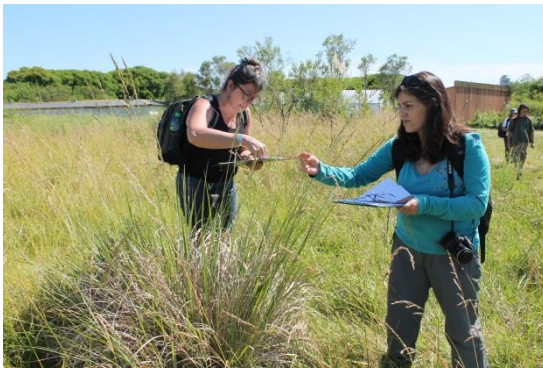
Sampling strategy



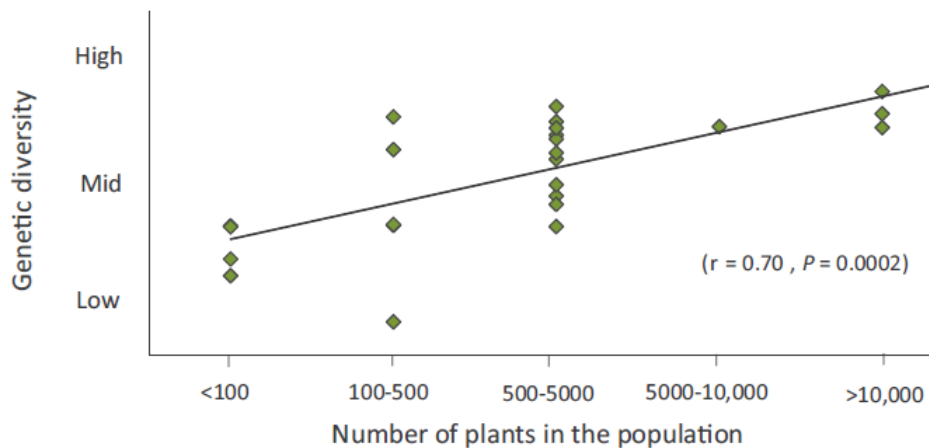
BGCI

Plants for the Planet

- Aim: Maximise the quality of the seed collection, making the most of the time and the resources available.



Sample **large** populations



Genetic diversity **increases** with population size

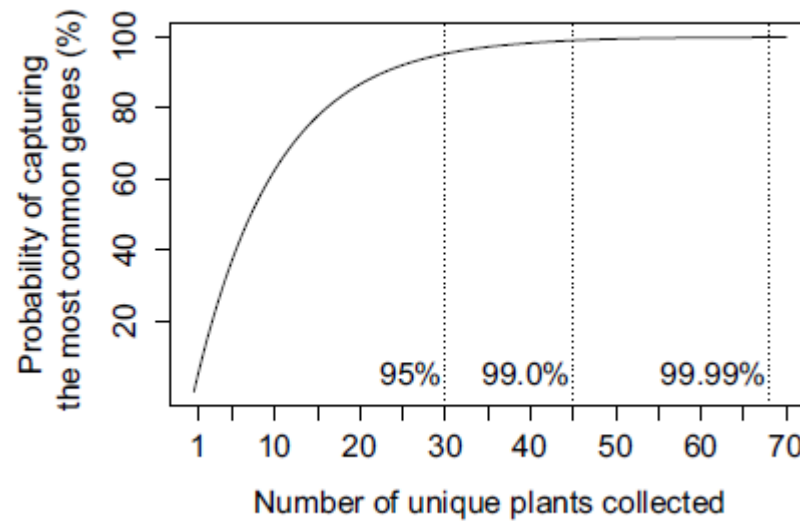
Genetic diversity



BGCI

Plants for the Planet

Outcrossing species



45 individuals are required for 99% of the most common genes

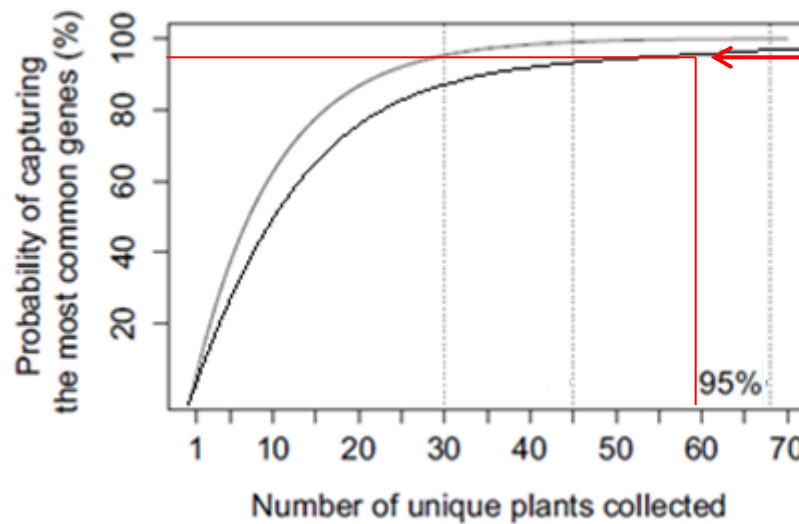
The likelihood of capturing all but the rarest forms of genetic diversity increases with the number of plants collected. Adapted from Basey *et al.* 2015

Genetic diversity



BGCI

Plants for the Planet



Inbreeding species

60 individuals are required for 95% of the most common genes

The likelihood of capturing all but the rarest forms of genetic diversity increases with the number of plants collected. Adapted from Basey *et al.* 2015

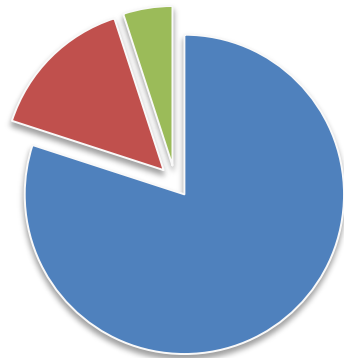
Inbreeding or outbreeding?



BGCI

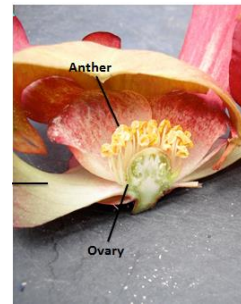
Plants for the Planet

Reproductive morphology of angiosperms

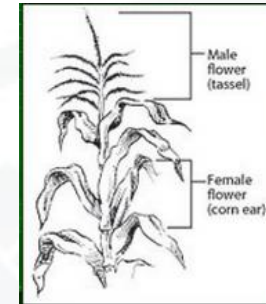


- Hermaphroditic
- Dioecious
- Monoecious

Hermaphroditic can in/outbreed



Monoecious can in/outbreed



Dioecious can only outbreed

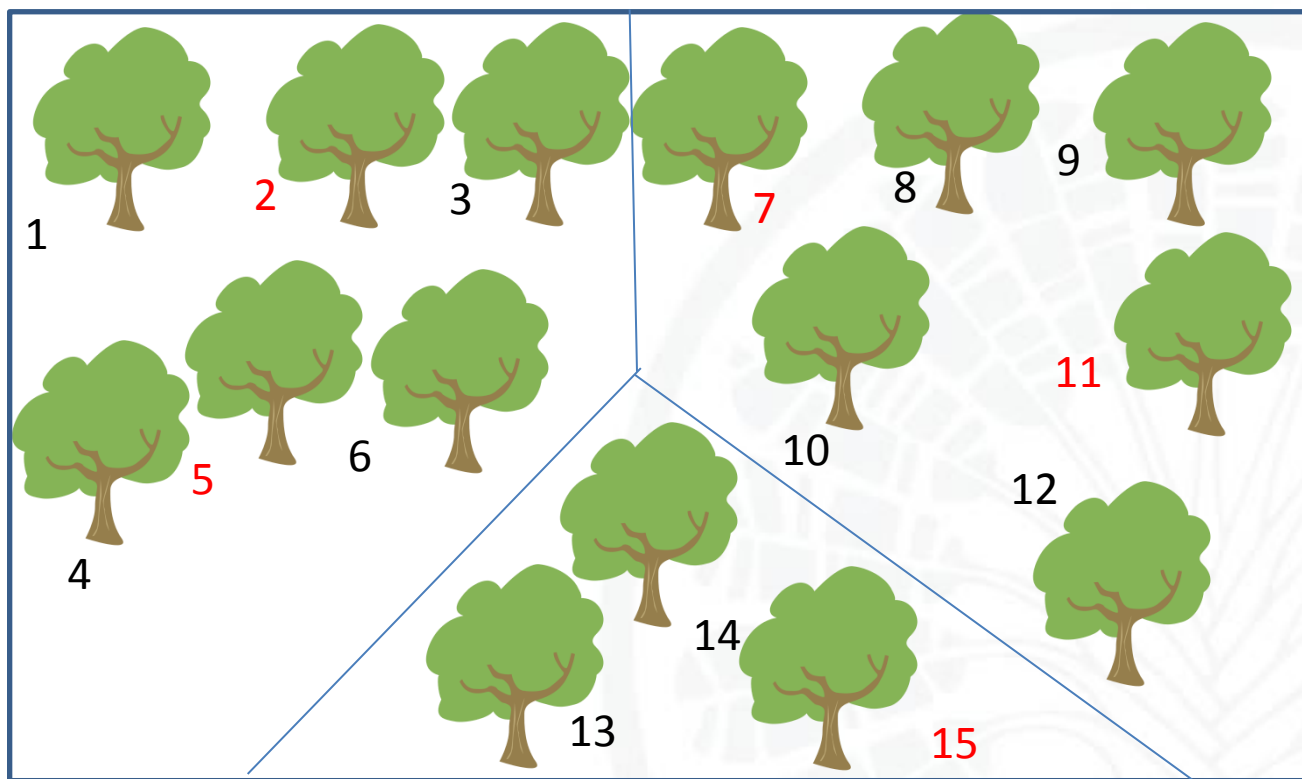


Difficult to know whether plants are inbreeding or outbreeding

Collectors are advised to sample from a minimum of 50 individuals from within a single population

Sampling Strategy

Collect randomly and evenly in a uniform way across all sectors of the population



Collection summary



BGCI

Plants for the Planet

Collect

- From large populations - the more individuals the more genetic diversity present
- Randomly and evenly
- Many individuals - A minimum of 50 individuals
- Collect from multiple populations

Additional tips to maximise diversity



BGCI

Plants for the Planet

- Sampling should be **random** – collect from plants throughout the site, including (wherever possible) difficult to access areas, edges and microclimates.
- **Don't** avoid less robust looking individuals or plants that look different and have unique growth forms
- **Do** avoid collecting clones and siblings – don't sample from plants that are close together

Quantity



BGCI

Plants for the Planet

How much seed do you need?		
	ACTIVITY	SEED REQUIRED
Conservation	Base collection in case of... <ul style="list-style-type: none">• loss of wild population or• need for regeneration of collection	500
Maintenance	Developing a germination protocol	100
	Viability monitoring over 200 years	650
Duplication	Seed stored and monitored at a second seed bank for safety reasons	1,150
Distribution	50-seed sample sent to users every second year for 200 years	5,000
Propagation & Restoration	Growing for display in botanic gardens & restoration	10,000
	Total	>20,000

Seed collection



BGCI

Plants for the Planet

- Hand picking of whole fruits



Used for shrubs, herbs and low hanging trees

Damaged/immature fruit can be excluded from the collection

Collecting vessels can be tied to the waist of the collector to allow for more efficient collecting

Time consuming for large collections

Seed collection

- Pruning clusters of fruit



Used for shrubs and trees

Secateurs or tree pruners can be used to collect clusters of fruit within reach and also out of reach.

Seeds can be assessed for quality before being added to the collection.

Seed collection



BGCI

Plants for the Planet

- **Shaking branches**



Used for trees

Seed can be collected by tarpaulin or buckets

Light shaking can dislodge ripe seed ready to disperse

Care should be taken not to damage the plant or collector

Light seed may be carried away by the wind.

Seed collection

- Stripping entire seed heads



Used for grasses and species with seed heads

Effective if fruit is loosely held on stem

Gloves may be required

- **Bagging seed heads**



Used for seed that would be lost otherwise

Can be used when frequent access to the site is available

Mesh bag is placed over the fruit and seed is captured as soon as they are shed.

Contents can be removed at intervals. Seed will always be collected at natural dispersal

Post-harvest handling

Starts in the field **immediately** following collection

Collect into buckets, cloth or paper bags

Keep seeds cool and dry

Seed/fruit left in a vehicle will overheat

High temperatures can reduce viability

Maintain ventilation

Spread damp seed to aid drying

Transport seed as fast as possible to the processing and storage facility

Herbarium specimen



BGCI

Plants for the Planet

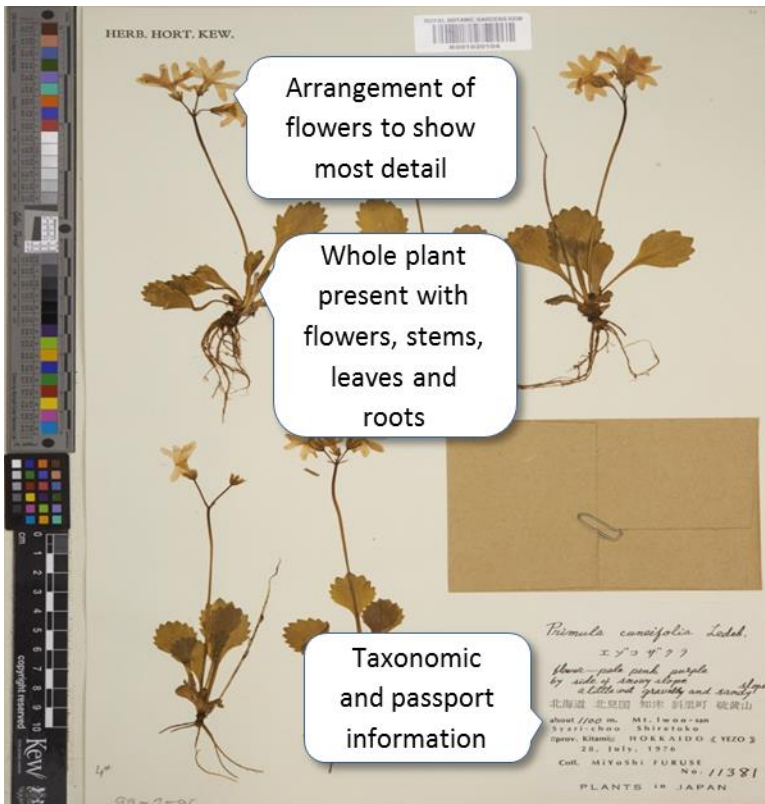
Essential for identification of the species.

Should be linked to the seed collection.

Ideally include all distinguishing features

- Flower/fruit
- fruiting structure
- vegetative material

Specimens should be dried and pressed



Mounted herbarium specimen.

© The Board of Trustees of the RBG, Kew


<http://specimens.kew.org/herbarium/K001020104>

Data collection in the field



BGCI

Plants for the Planet


Joint Tasmania-Millennium Seed Bank Project Seed & Voucher Collection Field Data Sheet				 Tasmania		
Date collected	/ / 20	Collection No.				
Collector(s)						
Location				Bioregion		
				Alt (M)		
Grid Ref.	WGS84 Lat.	°/ ' / "	Easting			
	WGS84 Lon.	°/ ' / "	Northing			
Species Information						
Family					Specimen Verified <input type="checkbox"/>	
Genus					By:	
Species						
~Pop. size	~Area occupied (Ha)					
Growth form	Tree	Shrub	Heath	Herb	Succulent	Vine
Flower/fruit colour					Average Height (M)	
Smell	Leaf/bark colour/texture					
Habitat Data						
Slope°	Aspect	Drainage		Good Medium Poor		
Geology	Soil texture					
Vegetation community						
Associated species						
Collection Data						
No. individuals from which seed was harvested				Herbarium specimens	<input type="checkbox"/> No.	
Notes						





Labelling- seed is useless without it!



Joint Tasmania-Millennium Seed Bank Project Seed & Voucher Collection Field Data Sheet			
Date collected	/ / 20	Collection No.	
Collector(s)			
Location	Bioregion		Alt (M)
Grid Ref.	W o r l d L o n	Lat ° ' / " * ° ' / " *	Easting Northing
Species Information			
Family			Specimen Verified By: <input type="checkbox"/>
Genus			
Species			
~Pop. size	~Area occupied (Ha)		
Growth form	Tree	Shrub	Heath Herb Succulent Vine
Flower/fruit colour			Average Height (M)
Smell	Leafbark colour/texture		
Habitat Data			
Slope°	Aspect	Drainage	Good Medium Poor
Geology	Soil texture		
Vegetation community			
Associated species			
Collection Data			
No. individuals from which seed was harvested		Herbarium specimens	<input type="checkbox"/> No.
Notes			



↔ Linking data ↔

- Species name if known
- Collection No./Field No.
- Date



BGCI

Plants for the Planet

End of Module Three (Seed Collection)

Why not try the [quick quiz?](#)

Then, go to Module Four ([Post Collection](#))



BGCI

Plants for the Planet

Connecting People • Sharing Knowledge • Saving Plants

Our Mission is to mobilise botanic gardens and engage partners in securing plant diversity for the well-being of people and the planet

Descanso House, 199 Kew Road, Richmond, Surrey, TW9 3BW, UK

www.bgci.org

 @bgci