Plant studbooks 5/12/14 by Robert Blackhall-Miles

Plant studbooking: what it is and how it works.

Studbooking is currently used in the breeding of domesticated animals and in the ex-situ conservation of zoo animals to maintain a genetically viable population of a species or to breed 'advantageous' characteristics into a species, currently, however, there has been little attempt made to studbook plants other than that done by commercial plant breeders trying to achieve a specific goal eg. A blue orchid or black rose.

The studbooking of plants is complicated by a number of factors the two largest of these being

1. The ability to clone plants through micro-propagation and vegetative propagation techniques
2. The sheer number of plant species it may need to be applied to.

My ideas surrounding plant stud-booking allow for both of these factors by

1. Having a 'safe' point at which the studbook is suspended i.e. when a sufficient number of genetically different individuals are held in ex-situ collections then the studbook will become inactive and be held until it may be required again in the future. Thus ensuring that a situation doesn't occur where all individuals in an ex-situ population are clonal or of a bottlenecked gene pool.
2. Allowing studbooks to be managed by private individuals as well as institutions, thus harnessing the knowledge and expertise of horticulturists worldwide. Allowing for large numbers of people to be studbook holders thus enabling the potential management of studbooks for many species of plants.

What species might a studbook be held for?

Initially studbooks would be set up for those species requiring the most urgent need for actively managed ex-situ populations. These may include plants endangered in the wild, threatened local populations and varieties of otherwise common species or species currently common in the wild but that may be threatened in the future by habitat destruction. Studbooking may also be extended to plants deemed rare in cultivation that may be required for commercialisation with the express purpose of funding the scheme/conservation.

So how does it work? (See fig. 1)

One overseeing organisation implements the program setting out the guidelines and policy, assessing members of genus steering groups and remaining accountable for the studbook program.

Genus steering groups (GSG's) will oversee and make decisions regarding different plant families (ideally GSG's will be comprised of scientists, taxonomists, horticulturists, conservationists and studbook holders). GSG's will work within the guidelines of the overseeing organisation and set criteria for studbook holders to work to.

Studbook holders (SBH's) will maintain the studbook for individual or groups of species overseeing the propagation and care of the species to the purpose of building the most genetically viable ex-situ population possible. They will keep records of where the plants are held, the number of plants held and actively instigate propagation of the plants. They will act as a 'go to' person for cultural

information and a distribution point for plants. A SBH may be an individual or a number of individuals all working towards the sole goal of building a genetically viable ex-situ population of an individual species. SBH's may be institutions such as botanic gardens, societies, schools or universities, private individuals or groups of private individuals. SBH's will work directly with institutions, gardens and individuals that hold plants of their target species (plant guardians). SBH's may be Plant guardians themselves or not actively cultivate the species in question.

What is involved in starting, expanding and maintaining stud books?

All that is required to start a studbook is a need to increase numbers of a species in an ex-situ population. Species requiring studbooks may be decided upon by the Institution overseeing the studbooking system in conjunction with the relevant GSG, a voluntary potential studbook holder and any relevant conservationists or organisations i.e. IUCN red list assessors, scientist working exclusively with the species in question or an institution currently holding a population of the species.

Once a species is decided upon, a GSG either set up or instructed and a studbook holder is found then it is up to the studbook holder to trace plants of the species in cultivation and seek cooperation from the people/institutions holding the plants. It would be necessary to evaluate provenance of the individual plants and give each plant an individual number/barcode/QR code that will remain with it or its clonal progeny until the studbook is closed. There will be a time limit for this period based on the urgency of the individual situation. At this point a required number of genetically distinct individuals will also be set which will determine the length of time the studbook will remain in active management.

Plants requiring a studbook but having limited genetic variation in cultivation may need to be supplemented with seed collected from wild individuals. Plants with limited genetic variability both in cultivation and the wild should be managed in a way that actively preserves the species in a safe manner i.e. with individuals held at many ex-situ collections for the purpose of population security.

Studbooks may also be used to manage back breeding projects where a plant has been so threatened by a lack of genetic diversity that an effort to preserve its genes has been made through hybridisation.

What happens when a 'genetically viable ex-situ population' is reached?

- The studbook will stop being actively managed and start being maintained in a passive manner
- Plant guardians will keep the studbook holder informed of any changes that may occur within the ex-situ population and records will need to be updated
- The studbook may be re-opened should it be deemed necessary through concern for the ex-situ population and or a need to increase the number of genetically distinct individuals of a species for planned future reintroduction, research or commercialisation.

Stud books as a lead into commercialisation of a species

By managing an ex-situ population in this way you are able to control the whereabouts of the ex-situ population of a species in a form that is managed. It allows for individual plants to be traced should

the need ever arise. Yet it also allows for a population to be built to a point whereby a decision can be made that allows the species to be released to commercial horticulture in a managed way too.

Some of the issues surrounding the commercialisation of plants are

- A lack of control of who plants are sold to
- Gardeners intrinsic need to propagate and distribute plants privately
- An inability to call 'known genetically distinct' plants back for propagation or reintroduction once they have been sold to private individuals.

By maintaining a studbook you maintain a 'known genetically distinct' population that you have full knowledge of, thus, allowing for micropropped/clonal/selected individuals to be mass produced if necessary without worry of where they end up.

It also means you keep control of the initial wave of sales allowing for maximum financial benefit towards Access and benefit sharing agreements or funding for conservation projects. (to be discussed in my notes on the certification of plants commercialised for financing conservation)

<u>How will the information be stored and shared?</u>

I envisage a computer/mobile device application being created to enable the easy exchange of information between GSG's, SBH's and Plant guardians. This will also enable data to be efficiently input at the time of propagation and uploaded to a main database at the next point of connection of the device to the internet.

<u>How will the plant studbook system be funded?</u>

The manpower put into the studbooking system in the form of GSG's and SBH's will be voluntary or built into the roles of those horticulturists/conservationist working for institutions and organisations involved in the scheme. There will be an initial cost involved in setting up the system and staff employed to oversee the processes involved. Funding will have to be sought in the initial instance for this. Eventually commercialisation of some of the species involved will create an income for the scheme and as such outside funding may be less necessary to the long term survival of the project. As time goes on an increase in species commercialised for the project will have a positive impact on the finances and will hopefully lead to funding of in-situ as well as ex-situ conservation.

Plant studbooks 5/12/14 by Robert Blackhall-Miles

Fig. 1: in diagram form it looks like this