ORAL SESSION 2 – Problems associated with the domestication and use of non-crop species

Seeds of diverse non-crop species in Brazil

Mirian T. S. Eira, Lead speaker and Chair
Embrapa, Brazilia, Distrito Federal, Brazil (meira@cenargen.embrapa.br)

More than ten thousand years ago, when man shifted his lifestyle from hunting and gathering to agriculture, societies began the process of domesticating and selecting varieties of plants to meet their food, clothing and health needs. For a long period of time, these needs were met by a small variety of species. In the 20th Century, agriculture underwent major transformations and new species are now being studied which have great potential for exploitation. With more than 50,000 species, Brazil has one of the richest floras in the world - nearly 19% of the world flora. Brazil's forests and other ecosystems are also an invaluable source of medicinal plants for many human diseases. Several problems that can arise while producing and dealing with seeds of non-crop species will be discussed, including the importance of some knowledge of the biology of the species and how to deal with those seeds in seed testing laboratories.

Desiccation tolerance and germination behaviour of nikau (*Rhopalostylis sapida* Wendl. et Drude) an endemic New Zealand palm

Craig McGill, Heather Outred, Chris Wood, Kay Kitchen and David Fountain
Institute of Natural Resources, PN433, Massey University, Private Bag 11-222, 4474 Palmerston North, New Zealand (c.r.mcgill@massey.ac.nz)

Rhopalostylis sapida (*Arecaceae*), nikau palm, is endemic to New Zealand. It is a species of lowland forests and is the southern most palm species in the world. Nikau is regarded as an iconic New Zealand native plant. This paper reports the only detailed study on seed desiccation tolerance and germination in nikau. Fruits were collected from a stand of palms growing in remnant forest in the lower North Island of New Zealand. A preliminary study established that nikau seed lost viability between 25% and 10% seed moisture. In a more detailed study freshly collected fruits were desiccated in silica gel from an initial seed moisture of 44% to 9% over 31 days. Germination, measured by radicle or leaf emergence, was assessed during desiccation. Germination decreased from 95% at 44% seed moisture to 77% at 21% seed moisture. A further 3% decline in seed moisture to 18% reduced germination to 27%. At 15% seed moisture germination was 4%. Control fruits were stored in moist vermiculite at 15°C during the desiccation trial. In vermiculite, seed moisture remained at 44% and germination at 95%. This data suggests nikau seed is non-orthodox in its storage behaviour. Nikau seed germination is slow and erratic. Time to 50% (T50) germination differed depending on seed colour at collection. Red seed took 144 days to reach 50% germination compared to 99 and 98 days respectively for seed collected when yellow or green. Electron microscopy showed evidence of limited starch storage in the embryo, but little of oil or protein storage organelles. No starch was evident in the endosperm.

Development of dormancy breaking treatments to enable germination testing of seeds of medicinal plants grown in Iran

Mohammad Khajeh-Hosseini, L. Tabrizi, G. Aziz and M. Jahan
University of Ferdowsi, Dept. of Crop Science, Faculty of Agriculture, University Pardis, Meidane Azadi, 9177948978 Mashhad, Iran (agr844@abdn. ac.uk)

Medicinal plants native to Iran are important sources of remedies for many maladies. Cultivation of species is an objective to both improve their availability and to assist projects that aim to analyse plants for their active ingredients. However, seed germination testing in the presence of dormancy in non-crop species presents problems in assessing seed quality for sowing. Seeds of 36 important medicinal plant species produced in North Iran (Mashhad), which had been stored in warehouses since October 2005, were tested for germination, both with and without dormancy breaking treatments. On the basis of their behaviour without dormancy breaking, the species were classified into 3 groups: germination > 60% (20

species); 40-60% (8 species); and < 40% (8 species). Dormancy breaking treatments improved germination in species taken from all three groups. Effective treatments were GA_3 (7 out of 11 species improved, e.g. *Hyoscyamus niger*), KNO_3 (1 species out of 5; *Nepeta crassifolia*), scarification (3 out of 4, e.g. *Securegia scorpioides*), and prechilling (2 out of 5, e.g. *Valerania officinalis*). The work continues to determine methods for all species showing dormancy to enable reliable assessment of seed quality and to improve the reliability of establishment in multiplication plots. Pre-sowing treatments to improve establishment and the effects of storage conditions on germination and dormancy are also being investigated

Seed longevity of *Hosta sieboldiana* and *H. albomarginata*

Kojiri Suzuki
Tokyo University of Agriculture, 1-1-1 Sakuragaoka, Setagaya-ku, 156 8502 Tokyo, Japan (kojiros@nodai.ac.jp)

We investigated seed longevity of *Hosta sieboldiana* and *H. albomarginata* following storage under wet or dry condition for about one year. Seeds of both species lost germinability after approximately 4 months of wet storage at 5°C but survived dry storage for 1 year at both 5°C and room temperature. However, *H. sieboldiana* seed germinability was lost after 15 months dry storage both at 5 °C and at room temperature. Seeds of *H. sieboldiana* and *H. albomarginata* are desiccation tolerant but appear to have short longevity similar to the seeds of some species in the *Salicaceae*, e.g. *Salix japonica*. Hostas and willows have similar habitat requirements, being distributed at the water's edge of streams, rivers or ponds, suggesting that reduced seed longevity may be associated with seed maturation in cool, moist environments.

Pattern of radiographic images of *Ginkgo biloba* (L.) seeds

Adriana R. Salinas, Roque M. Craviotto, Carina V. Gallo, Sabina A. Feerrari and Miriam R. Arango
Faculty of Agricultural Sciences, CC 14, Zavall, Argentina (arsalinas@gmail.com)

G. biloba is an ornamental and forest species originating from China and Japan. Its' wood is frequently used in carpentry and the leaves are used in modern medicine. The X-ray technique is a useful tool to study seed quality, anatomy and morphology of embryos and the formation of seed structures. The aim of this work was to make a pattern of radiographic and corresponding photographic images that enable characterization of the species by its seed anatomical and morphological structures, and to identify physical damage produced by insects. Digital radiography images were taken with X-ray equipment (SEMAX, INTA-TEXEL, Argentina). Digital photographic images corresponding to digital X-ray images were taken. Seeds were submitted to different treatments: a) seed imbibition in rolled paper at ambient temperature (20 °C) for 48 hours; b) artificial damage with a puncture in dry seeds simulating insect attack c) artificial damage that produced fissures in dry seeds d) artificial damage with a puncture on dry seeds simulating insect attack; e) artificial damage to produce fissures on dry seeds and then soaking during 24 hours. Digital radiographic and photographic images obtained in the different treatments showed the same clarity. They also permitted good diferentiation between empty and filled seeds, seeds with different degrees of filling, seeds with one or two embryos or seeds without embryo, seeds with abnormal or aborted embryos, seeds with artificial damage simulating insect attack and fissures. The X-ray technique permitted characterization of this species by their anatomical and morphological structures and detection of physical damage shown by a radiographic pattern of *G. biloba* seeds.

Standardization of seed testing procedures in four medicinal plants

Kota M. Kumari, Rohini, R. Ankaiah, Vilas A. Tonapi and K. Rajeswari
ANGRAU, National Seed Project, 500030 Hyderabad, Andhra Pradesh, India (kota_86@rediffmail.com)

Standardized reproducible seed testing procedures are essential for accurate evaluation of seed quality parameters. The procedures for testing the seeds of medicinal plants namely ashwagandha (*Withania somnifera*), kalmegh (*Andrographis parniculata*), senna (*Cassia angustifolia*) and tulasi (*Ocimum sanctum*) are not available in the National or International Rules for Seed Testing. Therefore, detailed