CONCLUSION

Identification of pine hybrids using SSR loci.

The fact that microsatellite markers developed in other species can be used successfully in the DNA profiling in related species, and specifically for the profiling of the *P. elliottii x P. caribaea* hybrids, makes this an extremely powerful and accessible technique. By eliminating the need for sequence information and marker development cross-species amplification of microsatellite markers greatly reduces the cost and time requirements involved in DNA profiling studies.

The results also indicated that not all microsatellite markers produced DNA fingerprints that were equally informative and / or useful. Generally polymorphic microsatellite markers were found to be highly informative and therefore far more useful than monomorphic markers, which tend to be relatively uninformative. Parental determination should therefore be approached via a process of elimination in order to accurately accept or reject the null hypothesis, that the embryo was the result of successful controlled pollination. As it is unlikely that a single locus will provide enough information upon which the null hypothesis may be rejected or accepted, the information from several loci should be pooled and analyzed together.

The results of the preliminary study indicated that the RAMs technique, although not as cost effective as simply using markers developed in related species, is potentially an effective way of developing microsatellite markers specific to the *P. elliottii x P.*

caribaea hybrids. The species-specific DNA fingerprints obtained using RAMs are highly reproducible and can be used to identify both inter- and intra-specific polymorphisms. The results were therefore promising enough to justify further investigation into this approach for marker development and perhaps even investigation into the potential of these markers for cross-species amplification.

The influence of storage and morphology on the viability of *Pinus caribaea* pollen

The results of the investigation on the effect of environmental conditions indicate that long term pollen viability can be maintained if the pollen is stored under specific conditions. The results indicated that only mature pollen from intermediate cones should be harvested and that if temperature and humidity are controlled during storage, then it should be possible to maintain *P. caribaea* pollen viability.

The highly significant association found to exist between *P. caribaea* pollen morphology and viability strongly suggests that a dimensional screening step would be beneficial during the selection of the paternal parent. This screening step would reduce the chances of inferior *P. caribaea* pollen parents from being used in crosses during hybrid production and therefore from entering into the hybrid performance trials in general. The correct storage of the *P. caribaea* pollen would ensure the viability of the pollen used in the cross and therefore result in increased pollination which should in turn result in increased fertilization.

SUMMARY

The study found that cross-species amplification of microsatellite markers developed in other species can be used successfully for the DNA profiling of related species, and more specifically for the DNA profiling of the *P. elliottii x P. caribaea* hybrids. This study also found that not all microsatellite markers produce DNA fingerprints that are equally useful and informative, and that the information from several markers should be pooled and analyzed together in order to make valid predictions relating to parental contribution and gene flow. Furthermore, it was found that the preliminary study on the usefulness of the RAMs technique for marker development indicated that the RAMs technique displayed great potential as an effective way of developing microsatellite markers specific to the *P. elliottii x P. caribaea* hybrids.

The study also found that environmental conditions to which the *P. caribaea* pollen is exposed may influence its long-term viability and that the viability may be maintained if the pollen is stored under optimal conditions. Furthermore, a statistically highly significant association was found to exist between *P. caribaea* pollen morphology and viability, thereby strongly suggesting that a dimensional screening step would be beneficial for the forestry industry before the selection of the pollen donors are made for pollination studies.

OPSOMMING

In die studie is bevind dat kruis-spesie amplifisering van mikrosattelietmerkers wat in ander species ontwikkel is, ook suksesvol vir DNA-profiele van naverwante spesies, en meer spesifiek vir die profiele van die *P. elliottii x P. caribaea* hibried, gebruik kan word. In die studie is verder bevind dat nie alle mikrosattelietmerkers ewe informatief of bruikbaar is nie. Daar is verder bevind dat die inligting wat met verskillende merkers verkry is, verskieslik saam geanaliseer moet word om sinvolle afleidings met betrekking tot geenvloei en ouerlike bydrae, te verkry. Daar is ook verder in 'n voorlopige studie oor die bruikbaarheid van die RAMs-tegniek bevind dat die tegniek groot potensiaal inhou om *P. elliottii x P. caribaea* hibried-spesifieke mikrosatteliete op 'n effektiewe manier te ontwikkel.

Die studie het verder getoon dat die omgewingstoestande waaraan stuifmeel blootgestel word, die langtermyn kiemkragtigheid van stuifmeel beïnvloed. Kiemkragtigheid kan behou word indien die kondisies waarby die stuifmeel geberg word, optimaal is. Die studie het verder aangetoon dat daar 'n hoogs betroubare verwantskap tussen *P. caribaea* stuifmeelmorfologie en kiemkragtigheid bestaan. Dit wil dus voorkom asof dit voordelig vir die bosboubedryf sou wees om die dimensies van stuifmeel eers te bepaal, alvorens finale keuses van vaderlike donors vir bestuiwingstudies gemaak word.

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