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Nordic Forest Research  
Co-operation Committee (SNS)

*Send the report to SNS-secretaries Jonas Rönnberg and Inga Bödeker (bodeker.sns@slu.se)*

#### FINAL REPORT for CAR

Please notice that the size of text sections in the form can be adjusted if needed.  
The length of the final report should not exceed 3 pages. **Supplementary information can be attached**

1. CAR titel	AdapCAR
2. CAR coordinator (name, address, telephone, e-mail)	Professor Erik D. Kjær, Forest & Landscape Denmark, University of Copenhagen, Rolighedsvej 21, DK-1958 Frederiksberg C. Telephone: +45 353 31624 e-mail: <a href="mailto:edk@ign.ku.dk">edk@ign.ku.dk</a>
3. Duration	1. January 2011 – 31. December 2015
4. Cost	SNS-funding: 2 000 000 DKK      Other funding:

<p>5. The purpose of the CAR / main problems / hypotheses addressed</p>	<p>The overall objective of AdapCAR was to contribute with knowledge to improve management of forest genetic resources aiming at productive, healthy and adaptable forests and forest ecosystems considering climate change, which will affect the length of the growing season, incidents of spring- and autumn frost, drought, pest and diseases in Nordic forestry. This requires better understanding of genetic processes and with focus on the adaptive potential of Nordic species, effective breeding for multiple traits of economic importance, studies on genetic deployment and effective vegetative propagation techniques.</p> <p>On the above background the specific objective of AdapCAR was to enhance collaboration including exchange of ideas, and development of new projects in forest genetic research and breeding in the Nordic region in order to (1) obtain a better understanding on adaptation to climate change, (2) to contribute to increased CO2 sequestration and biomass production, (3) promote development and deployment of forest reproductive material that will combine high value production with superior health, minimum climatic injuries and long term stability and (4) contribute to a Nordic research environment, where the mutual interdependency between genetic and genomic research, wise genetic management, effective improvement, and corresponding timely deployment are recognized.</p>
<p>6. Brief description of the network and research plan and of possible larger deviations from the plan</p>	<p>AdapCAR have arranged and supported scientific meetings and workshops to promote exchange of knowledge among forest genetic researchers in the Nordic and Baltic countries, supported coordination for new applications, organized training for young scientists and supported scientific missions. The project has been implemented without major deviation from the plan.</p>
<p>7. Results (max 2 pages)</p>	<p>AdapCAR has through scientific meetings, workshops, PhD courses, publications contributed an exchange of ideas and knowledge among Nordic researchers on adaptation potential, resistance breeding, assisted migration, deployment of genetic gains. Also, AdapCar has supported interaction among Nordic researchers and researchers from other parts of Europe, USA and Canada.</p> <p>AdapCAR has facilitated meetings to develop new projects related to ash dieback in a Nordic as well as a European context, and organized training workshop on selection and breeding against the serious new disease.</p> <p>A better understanding of how trees adapt to climate change, resistance breeding and development of genetic material for high value production was achieved through three scientific workshops/meetings and PhD courses in respectively Latvia 2012, Uppsala 2014 and Iceland 2015. The opportunities of genomics and the interdependency of genetic and genomic research were covered by a combined workshop and PhD course in Copenhagen 2013 and a workshop was held to explore the possibility of using somatic embryogenesis for deployment of highly productive- and adapted genetic material.</p> <p><u>List of main activities:</u></p> <p>AdapCAR meeting in Copenhagen 15-16 March 2011, where objectives of the AdapCAR was presented and decisions made concerning plans for- and content of meetings, reviews and dissemination and co-operation with pathologists and entomologists.</p> <p>AdapCAR meeting 3-5 October 2012 in Riga, Latvia. Topics: Genetic aspects of adaptation and Mitigation: forest health, wood quality and</p>

	<p>biomass production. This meeting was organised in cooperation with IUFRO (WP 2.02.00)</p> <p>Combined workshop and PhD course on genomics based breeding in forest trees at the University of Copenhagen 16-19 September 2013. Ross Whetten and Fikrit Isik from North Carolina University were invited as lecturers for the PhD course.</p> <p>A workshop/field tour on breeding for resistance against Ash-dieback in Denmark 7 September 2013, visiting field trials, demonstration of techniques and discussion of future cooperation and exchange of knowledge and data.</p> <p>Workshop in Uppsala 2014 on the topic: “Somatic Embryogenesis for future forestry – capturing the genetic gains from breeding programs and securing elite plant deployment for production and climate adaptability; status, implementation and expected results”.</p> <p>Workshop to plan an EU application on Forest ecosystem restoration 3<sup>rd</sup> of March 2014 in Copenhagen with participants from several countries. The application was submitted in 2015.</p> <p>Scientific meeting and PhD summer school in Iceland August 24-28, 2015 on global change and evolutionary potential of forest trees. The meeting and Summer school was arranged in cooperation with the European EVOLTREE network.</p> <p>An AdapCAR supported coordination in 2012 in relation to application and implementation of the SNS projects: ‘Risk assessment of new tree species’, and ‘Åskedød i Nordeuropa’.</p> <p>AdapCar supported development of the review on ‘The role of exotic species in Nordic Forestry’</p> <p>AdapCar supported development of the review on ‘Historic transfer of forest reproductive material in the Nordic region: drivers, scale and implications’</p> <p>AdapCar supported development of the review on ‘The genetic and economic gains from forest tree breeding programs in the Nordic countries’</p> <p>AdapCAR supported four scientific missions aiming at understanding population structures of Scots pine and clinal variations in phenology in Norway spruce and relations to SNPs.</p> <p>Four policy briefs developed, as well as conclusions from the meeting in Lativa</p>
<p>8. What advantages have been gained by the Nordic collaboration</p>	<p>AdapCAR have supported collaboration and given rise to Nordic and Baltic projects related to ash dieback. Nordic collaboration is of huge advantage in terms of testing forest genetic material in different environments to develop adapted genetic material for a future climate. The collaboration has also highlighted the competence of the different countries such as e.g. the advanced research in epigenetics in Norway, advanced breeding tools in Sweden, advanced techniques within an area as somatic embryogenesis in Finland.</p>

<p>9. Publications and other communication activities (International scientific peer reviewed journals, other scientific publications, short communications, web etc.)</p>	<p>Aronen T, Egertsdotter U (2014). Close to application of somatic embryogenesis. SNS News and Views 6 2014.</p> <p>Clapham D, Egertsdotter U, Aronen T (2014). AdapCAR workshop report: Somatic embryogenesis for future forestry – capturing the genetic gains from the breeding programme and securing elite plant deployment for production and climate adaptability; status, implementation and expected results. Published at the AdapCAR homepage.</p> <p>Hansen JK, Kjær E (2013) Genomics based breeding in forest trees. NB Forest Policy and Research Briefs</p> <p>Kjær E (2013) Introduced species in a changed climate – how should we handle the risks? SNS News and Views 7 2013</p> <p>Kjær ED, Lobo, Myking T (2014) The role of exotic tree species in Nordic forestry. <i>Scan. J. For. Res.</i> 29: 323-332.</p> <p>Myking T, Rusanen M, Steffenrem A, Kjær ED, Jansson G, 2016. Historic transfer of forest reproductive material in the Nordic region: drivers, scale and implications. <i>Forestry</i> doi: 10.1093/forestry/cpw020</p> <p>Jansson G, Hansen JK, Haapanen M, Kvaalen H, Steffenrem A. The genetic and economic gains from forest tree breeding programs in the Nordic countries. Submitted to <i>Scan. J. For. Res.</i> February 2016.</p> <p>Minutes and abstracts from AdapCAR meetings at the AdapCAR homepage.</p>
<p>10. CAR summary (about 1/3 page) for possible use in the News &amp; Views section of Scandinavian Journal of Forest Research</p>	<p>The Nordic network AdapCAR running from 2011-2015 contributed to management of forest genetic resources aiming at productive, healthy and adaptable forests and forest ecosystems considering climate change in the Nordic and Baltic countries.</p> <p>Activities within the project supported training and exchange of technical expertise. The project also facilitated the scientific cooperation on investigation of the importance of retaining genetic variation of the tree species in relation to climate change, risk of new pest and pathogens and as pre-requisite for continued breeding effort.</p> <p>Several meeting and workshop has been organized.</p> <p>Development of scientific reviews on the role exotic species, the role of exotic provenances of native species and the economic importance of present and future breeding programs has been supported.</p> <p>The successor of AdapCAR is HealGenCAR running from 2016-2020.</p>
<p>11. Date and signature</p>	<p>Date: 1/6.2016</p> <p>Signature of CAR coordinator:</p> 