Danish Research Centre for Organic Farming

Midterm Status Report 2003 and Application for Continuation in 2004

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The Directorate for Food, Fisheries and Agro Business
under the Danish Ministry of Food, Agriculture and Fisheries

1. Research program

Research in organic farming 2000-2005 (DARCOF II)

2. Project title and number

FØJOII-29: Nature Quality in Organic Farming

3. Head of project

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6. Project period (month, year)

Start of project:	2001
End of project:	2004

7. Annual report of the project, its results and progress, and application for continuation in 2003

A. Project summary

The work is organised in five work packages (WP 1-5, Table A1). Since the start in July 2001 the following work has been accomplished:

- WP 1. Starting up seminar and the annual seminars have served as a successful platform for project planning and cross-cutting activities. The general project co-ordination and planning of field work and selection of case study areas has been stimulated both at these meetings and in separate meetings with the WP responsibles. The first cross-cutting (CC_4) has been accomplished in close co-operation with WP 5 and all project scientists. A homepage for the project is now available.
- WP 2. Eleven case areas with high concentration of organic farmers have been selected and 347 farmers have been interviewed. A database holding this information has been constructed. Organic farms show a regional specialisation similar to conventional farms. At the regional level organic farms are concentrated in counties with a higher share of dairy farms. Within counties however, there are important local differences with other factors involved. A GIS-based method for case-area delimitation in the PhD landscape study has been developed.
- WP 3. Inventory data from 24 organic farms in two case areas with information on vegetation composition and arthropods has been analysed. New species for Denmark was found and arthropod indicators showed a good correlation to nature quality. Colonisation experiments showed that moss diversity is favoured by grazing and reduced by fertilisation. There was significantly higher plant diversity in hedges and field boundaries on organic farms than on traditional farms. This effect is evident after only 3-4 years of Organic Farming Period and further increased after 7 years
- WP 4. Data from the same 24 organic farms and experimental fields of Foulum and Flakkebjerg has been collected in 2002 and 2003. Soil fauna diversity is influenced by soil type, tillage intensity and fertiliser use as well as crop and grazing history. In the experimental plots soil fauna and surface arthropods only showed little response to fertiliser use and catch crops. A 10x10-km landscape has been digitised in the ALMASS landscape model and appropriate scenarios and crop rotations are under construction.
- WP 5. Results from the first project workshop (CC_4) in 2002 on indicators for esthetical qualities show that a more professional use of the esthetical experience is difficult for many natural scientist. Serious illness has postponed work in 2003 but the final outcome of the work package is expected to be achieved.

Table A.1: Work package list

No.	Work package title	Participants*	Budget (1.000 DKK)	Start	End	Deliverable no(s):
1	Project management and interactions	Jesper Fredshavn, Knud Tybirk	0.6	2000	2004	D1-12
2	Localisation, diversification and extensification in organic farming	Pia Frederiksen, Vibeke Langer; Pernille Kaltoft, Gregor Levin	1.7	2000	2004	D13-22
3	Biological diversity and organic farming	Rasmus Ejrnæs, Knud Tybirk, Erik Aude, Thomas Secher, Peter Gjelstrup	2.0	2000	2004	D23-30
4	Ecosystem diversity and function of the fields in organic farming	Jørgen A. Axelsen, Paul Henning Krogh, Marianne B. Pedersen, Peter Odderskær, Chris J. Topping,	3.0	2000	2004	D31-39

		Søren Toft, Gabor Löwei				
5	Organic Farming and Landscape Quality – Perceptions and Practices	Kathrine Højring, Egon Noe NN	1.7	2000	2004	D40-48

* Responsible participants are underlined

B. Objectives and expected achievements

The overall aim of the project is to identify the key components that ensure a continuous development of organic farming towards a closer integration of nature quality with food production. To accomplish this, the project will develop a common platform of understanding of how the localisation, diversity and intensity of organic farms influence landscape and nature quality (Driving forces and Pressure indicators). WP 2 will achieve this. This platform will qualify and give perspective to the discussion of how the three major components (State-Impact indicators) of nature quality as identified recently (Tybirk & Alrøe 2001) can be combined locally and regionally:

- biological diversity (WP 3)
- ecosystem functioning (WP 4)
- esthetical landscape perception (WP 5)

The project will develop relevant definitions and simple indicators to identify each aspect separately. However, the multi-disciplinarity of this project gives us an opportunity bring the separate analysis together and investigate how these potentially conflicting considerations can be integrated (WP 1) and suggest future pathways for the development of organic farming. The project will focus on identifying relationships between the three aspects separately and in combination, and scenarios will be used to show the consequences of organic farming practices for selected nature quality aspects.

The project is expected to achieve detailed information on the historic development of localisation of organic farms and the conditions that influence this. The organic farmers, their farming practices, their intentions and actual ability to conserve and promote biological and ecological as well as esthetical qualities will be characterised in details with the aim of identifying barriers and possible solutions for the development of organic farming. The project will be able to characterise organic farmed landscapes and their biological attributes and develop tools for communication of different conceptions of nature.

Relevant indicators will be developed to enable farmers, the public and the administrative bodies to set goals for an integration of nature quality considerations in the future development of a sustainable organic farming on the habitat, the farm and the landscape level. These indicators will also be appropriate to measure whether organic farming is actually approaching these goals.

C. Annual results and progress

C.1 Description (summary) of main results and conclusions

Localisation, diversification and extensification in organic farming

In 11 case-areas with relative high-density organic farming, 347 organic farmers have been interviewed on field management and the presence and management of small biotopes as well as non-farm activities. The 347 farmers represent approximately 10% of all Danish organic farmers in 2001, and this information has been combined with registry information on land use in 2001. Based on the information on management practice, one of the outcomes of the database will be an overall score of intensity of the individual farm. Preliminary analyses of 596 permanent grasslands show that almost half of the permanent grassland fields on organic farms are more than 40 years old. The management is generally very extensive with only 7% of the fields being fertilised. Almost all fertilisation takes place on the young grasslands less than 40 years old.

A study on localisation has shown regional concentrations of organic farms. These concentrations are to some extent related to the regional specialisation of organic farms, which are similar to the general agricultural specialisation in Denmark. Other factors are regionally favourable conditions like county support, advisory services focussing on organic farming and access to structural

fund support, as well as possible metropolitan area effects. At the local level it was found that 658 or one third of the Danish parishes consistently stay without organic farms. At this level intra-regional variations in concentration is strong, suggesting that local aspects contribute to the conversion process. Historical analysis of localisation showed that the localisation pattern in 1994 and 1997 continued in 2001, indicating that a local diffusion and concentration process is still active. There is no strong indication of a spatial rationalisation (re-conversion in periphery).

Three areas for qualitative studies have been selected with focus on areas with lack of conversion located close to areas with dense conversion, and re-converters vs. farmers who stay in organic farming.

Nature quality in organically cultivated soil

Soil fauna diversity, as well as total mite and springtail numbers was correlated with soil type, tillage intensity and fertiliser use as well as crop and grazing history and duration of the current state of the field. The 430 samples taken in 2002 on a wide range of organically farmed fields also showed that soil type interacted with crop type and grazing intensity. A higher number of mites and springtails were found in crops that included clover, almost independently of soil type. Higher numbers of mites were found at high grazing intensity compared to low grazing intensity on the same soil type. The results will be used to characterise the effect on soil fauna quality of each treatment, which again will contribute to a parameter characterising the overall soil fauna diversity on the farm.

Nature quality on organically farmed fields

In crop rotation experiments on Foulum and Flakkebjerg research stations the effect of manure and catch crop were analysed. Flying as well as ground-active arthropods were collected in winter wheat, and soil micro fauna and fungal activity were recorded. Surprisingly, only weak effects of organic manure input and undersown catch crops were found in the 2002 data. The collembola density was very high in all treatment with averages around 60,000 per m^2 in Foulum and 20,000 per m^2 in Flakkebjerg. No effects on aphid control were recorded at the two locations. In 2003 an experiment to boost the prey fauna for the polyphagous predators was undertaken. This experiment excluded effects of microhabitat variation, and by adding a biochemical analysis to animals from three trophic levels in the field there is an opportunity to investigate for the first time how nutrients (and especially the ratio between nutrients) are travelling through an agro-ecosystem.

Modeling the effect of organic farming on a landscape level

A 10 by 10 km area north east of Herning has been digitised with respect to all landscape features except for road site verges. The area is part of the 11 interviewed areas. Scenarios are being developed with different levels of organic farms present and different levels of crop management intensification on organic farms (mechanical weeding, density of live stock grazing, watering). The effects of the scenarios will be tested on the following species: carabid beetle (*Agonum dorsale*), Linyphiid spider (*Erigone sp.*) and skylark as these species are expected to be the most sensitive species in relation to impacts following the agricultural changes described above.

Nature quality on the uncultivated and permanently grassed areas

A large biodiversity was found on the uncultivated and permanently grassed areas. In 885 plots on 24 farms a total of 561 plant species were found. Most plots were dominated by the same common species of the agricultural landscape. All uncultivated and permanently grassed areas were sampled on the farms, thus giving a statistically valid picture of the vegetation composition in the sampled areas. Meadows and dry grasslands cover most area, but the many linear hedges and field boundaries constitute a larger part of the samples. Only a minor part of the plots are EU Habitat types or protected areas according to Danish Nature Protection Act.

On a gradient of nature quality 100 plots were selected for registration of arthropods and plant biomass. Three new cicada and one new spider species of Denmark were found in these plots. A preliminary analysis shows that the arthropod species follow the same nature quality gradient found in the plant species. Thus, a natural area highly influenced by agricultural practice, poor in original plant species and dominated by common and opportunistic plant species is also poor in original arthropod species. And opposite, the rare and original plant and arthropod species are found on the same natural areas with only little intensive agricultural influence.

Moss and plant species were recorded in an experimental study of the influence of grassing and fertilisation on plant colonisation in uncultivated areas. The moss data show that good conditions for mosses favours more species, as the number of species is strongly correlated to the total area of mosses. Moss colonisation is favoured by grazing and reduced by fertilisation.

Field studies showed significantly higher plant and fly diversity in hedges and field boundaries on organic farms than on traditional farms. This effect is evident after only 3-4 years and further increased after 7 years in the case of plants. The colonisation is in both cases primarily from common species, but the organic farms have more plant species from nutrient low biotopes.

The farmer as manager of nature quality

The farmer is the primary decision-maker and manager of nature quality on his farm. In the end his understanding and priority of nature quality decides the actual management on the farm. To strengthen his understanding of the different aspects of biological, agronomical and esthetical nature it is necessary to recognise his own competence and to communicate new expert knowledge. Possibilities and barriers are to be identified in this communication between farmers and experts. One of the possibilities of a common language is expected to be the esthetical experience. However preliminary results from an internal workshop revealed that a more professional use of the esthetical experience is difficult for many natural scientists.

C.2 Fulfilment of deliverables and milestones

(To be completed for each work package)

WP 1 Project management and interactions	**Time schedule according to application**	**Deviations, if any***
Task		
1. Project co-ordination		
2. Cross-cuttings		
Deliverables		
1. Starting-up seminar	04.01	OK 09.01
2. Annual co-ordination meeting	01.02-04	OK 06.02, 08.03
3. Annual status report	01.02-04	OK 11.01, 09.02, 09.03
4. CC_1 Impact of farm localisation and character on biological diversity.	03.02 and 06.04	OK 06.02
5. CC_2 Farm management, ownership, collaboration, value conceptions and nature values.	10.04	
6. CC_3 Farmers conception of nature and actual biological quality of his farm.	12.03	
7. CC_4: Workshop on the aesthetic perception of biological quality.	10.02	OK 06.02
8. CC_5 Functional interpretation of the response of arthropods to the organically farmed landscape.	03.04	
10. CC_7 Landscape scenarios.	03.04	
11. CC_8 Workshop on identified correlations.	05.04	
12. CC_9: Workshop on Indicators.	09.04	

** Deviations are to be further discussed in D*

WP 2. Localisation, diversification and extensification in organic farming	**Time schedule according to application**	**Deviations, if any***
Task		
1. Regional analysis of organic farms in Denmark		
2. Selection of case areas		
3. Local social and cultural context		

4. Production, diversity and nature practice on existing farms a. Descriptive analysis of management practises b. Analysis of farm characteristics and nature practises		
5. Structural farm characteristics and nature practise		
6. Changes in farm diversity		
7. Landscape changes following conversion to organic farming	late start due to ph.d. vacancy	
8. Forms and levels of organisation for management of nature quality	*relict from earlier project description*	*deleted in approved project*
Deliverables		
13. Regional localisation of organic farm – actual and historical development, regional specialisation(farm types)	05.02	OK
14. Regional variation in Danish organic production (Various diversity measures and intensity in a regional context)	04.04	
15. Social relations and spatial pattern: case area 1	03.03	02.04*
16. Social relations and spatial pattern: case area 2 and 3	12.03	09.04*
17. Integration of spatial and social processes in organic farming	12.04	
18. Database fully available for cross-cuttings	02.03	OK 09.03*
19. Production, diversity and nature practise on existing organic farms in Denmark a. Farm management on organic farms b. Diversity and nature practises on organic farms	12.03	 03.04* 09.04*
20. Changes in farm diversity and nature practise with conversion to organic farming	05.04	12.04*
21. The impact of organic farming on landscape structure and –change	09.03	04.05*
22. Potentials of among-farm collaboration for management of nature and landscape qualities	*relict from earlier projectdescription*	*deleted in approved project*
Milestones		
M1: National analysis of localisation and diversity completed	06.02	12.03*
M2: Landscape analysis completed	06.03	12.03*
M3: Historical analysis completed	12.03	OK
M4: Localisation of organic farms completed, two case areas selected	09.01	OK
M5: Additional case area(s) selected	06.02	OK
M6: Interviews with key persons, case area 1 and 2	03.02	09.03*
M7: In depth interviews completed, case area 1	08.02	12.03*
M8: In depth interviews completed, case area 2 and 3	09.03	06.04*
M9: Farm information from central registers retrieved	09.01	OK
M10: Survey scheme designed and tested	03.02	OK
M11 Survey in case areas completed	12.02	OK
M12: Data analysis completed a. Descriptive analysis completed b. Analysis of farm characteristics and nature practises	06.03	 11.03* 05.04*
M13: Conversion data from applications for autorisation processed	03.03	 03.04*
M 14: Supplementary interviews completed	06.03	 06.04*
M15: Data analysis completed	12.03	09.04*
M16: Case area for pilot study selected		OK
M17: Pilot study finished, method adjusted		11.03*

M18: Selection of all case areas completed		11.03 *
M18A: GIS analysis of landscape structure completed		08.04
M19: In-depth interviews carried out	*relict from earlier projectdescription*	*deleted in approved project*

** Deviations are to be further discussed in D*

WP 3. Biological diversity and organic farming	**Time schedule according to application**	**Deviations, if any***
Task		
1. Floristic inventory of organic farms		
2. Experimental test of colonisation limitation		
3. Gradient analysis and modelling of biological diversity		
4. Synthesis – models, indicators and principles		
Deliverables		
23. The contribution of organic agriculture to biological diversity	07.02	Completed 05.03*
24. Manuscript: The importance of colonisation limitation for the diversity of grassland and hedgerows on organic farms	12.03	Manuscript submitted 09.03
25. Manuscript: Gradient analysis of plant and invertebrate communities in organic farms	*relict from earlier projectdescription*	*deleted in approved project*
26. Manuscript: Predicting plant and invertebrate diversity in grassland habitats of organic farms	03.04	
27. Manuscript: Functional interpretation of the distribution of arthropods in the agricultural landscape	05.04	
28. Indicators for habitat quality in organic agriculture	09.04	
29. Impact of farm localisation and land use on biological diversity	*relict from earlier projectdescription*	*deleted in approved project*
30. Integration of biological conservation into organic agriculture	*relict from earlier projectdescription*	*deleted in approved project*
Milestones		
M20: 30-50 farms selected	06.01	OK
M21: Field inventory completed	09.01	OK
M23: Statistical summary for area, farm, and species data	03.02	OK 0602*
M24: Experiment established	09.01	OK
M25: Recording of first year establishment in experiment	10.02	OK
M26: Recording of second year survival in experiment	10.03	OK
M27: Statistical analysis of experiment completed	12.03	
M28: Selection of sample sites	03.02	OK 0602*
M29: Completed sampling of plants	09.02	OK
M30: Completed sampling of arthropods	09.02	OK
M31: Completed identification of arthropods	08.03	OK
M32: Completed sampling and analyses of environment	10.03	
M33: Gradient analyses and statistical models.	12.03	
M34: Tests for hypothesised relationships	02.04	
M35: Completed analysis of indicators and models for priorisation.	06.04	

** Deviations are to be further discussed in D*

WP 4 Ecosystem diversity and function of the fields in organic farming	**Time schedule according to application**	**Deviations, if any***
Task		
1. Development of indicators of nature quality on organic fields.		
2. A test of the hypothesis that increased biodiversity enhances the beneficial ecological mechanisms		
3. Modelling of consequences of crop rotations, tillage and landscape structures on mobile organism		
Deliverables		
31. Suggestion to indicator system	09.04	
32. Scientific paper on indicator system	12.04	
33. Suggestions for changes in management practice to promote desirable species in organic fields	12.03	
34. Scientific paper on crop rotations and polyphageous predators	*relict from earlier projectdescription*	*deleted in approved project*
35. Scientific paper on the connection between soil fauna and polyphageous predators	12.03	
36. Scientific paper on the relation between biodiversity and aphid control	12.03	
37. Entry at the Danish Plant Protection Conference	Every March	Not accomplished *
38. Scientific paper on the impacts of various organic farm practices on the mobile organisms	09.03	12.03*
39. Scientific paper on the impacts of farm location on the mobile organisms	*relict from earlier projectdescription*	*deleted in approved project*
Milestones		
M36: Plan for low intensity sampling ready	03.02	OK
M37: Low intensity sampling finished	06.02	OK (10.02)*
M38: Low intensity data treatment finished	12.02	OK
M39: Tentative indicator system designed	03.03	OK (09.03)*
M40: High intensity sampling plan ready	03.03	OK
M41: High intensity sampling finished	09.03	10.03*
M43: High intensity data treatment finished	03.04	
M44: Detailed research plan for the year is developed	03.02-04	OK
M45: Additional extractors manufactured	06.01	OK
M46: The years experiments finished	03.02-04	OK (06.02-03)
M47: Digitisation of new model landscape (revised title)	08.02	09.03*

** Deviations are to be further discussed in D*

WP 5. Organic Farming and Landscape Quality – Perceptions and Practices	**Time schedule according to application**	**Deviations, if any***
Task		
1. Landscape analysis		
2. Analysis of the farmer's role in the production and maintenance of nature and landscape quality		
3. Development of methods for communication about nature and landscape quality		

Deliverables		
40. The aesthetic perception of biological quality	06.02	OK
41. The aesthetic perception of biological quality	12.02	12.03*
42. The aesthetic quality of organically farmed landscapes	02.04	
43. Nature and landscape quality – organic farmers value conceptions	12.03	
44. Value conceptions, farm maintenance and biological quality	08.04	
45. The contribution of farming practice to aesthetic quality	08.04	
46. Local participation in nature and landscape quality assessment	12.04	
47. Operational indicators in communication and decision-making processes	*relict from earlier project description*	*deleted in approved project*
48. Indicators for nature and landscape quality as instruments in awareness raising and decision-making	12.04	
Milestones		
M48: Selection and description of study areas	12.01	12.03*
M49: Landscape analysis	06.02	12.03*
M50: Basic interviews	06.02	12.03*
M51: Selection of production data from wp2	12.02	12.03*
M52: Selection of biological data from wp3 and 4	09.02	12.03*
M 53: Analysis and description of aesthetic landscape quality	03.04	
M55: Data collection – individual interviews	07.02	12.03*
M56: Data analysis – individual interviews	03.03	02.04*
M57: Data collection – focus group interviews	12.02-06.03-12.03-06.04	01.04-03-04*
M58: Data analysis – focus group interviews	12.04	04.04
M59: Development of indicators	06.04	
M60: Interviews with key persons, case area 1 and 2	12.04	
M61: Synthesis of objectives	12.04	

** Deviations are to be further discussed in D*

D. Description of deviations and subsequent adjustments of plans

WP 1
There are no changes in plans, but problems are anticipated in accomplishing CC_3 and CC_8 timely due to delays in WP 2 and 5. An adjournment of up till 6 months on both workshops is considered. That would allow us to integrate the delayed and late parts of the project in the final conclusions. As the last workshop would then have to be held after the originally planned project period, an extension of the period would be necessary.

WP 2
The large database of interview and spatial information was expanded compared to originally planned. The subsequent and necessary data quality control was more time consuming than expected, and consequently data access delayed. The interviews on social relations and spatial patterns will be delayed almost a year due to other duties and no possibility for substitutes. Only preliminary results from this part of WP 2 will be available for the Workshop in May 04 (CC_8). An analysis of converted farmers has been delayed due to a 4 months visit to New Zealand.

WP 3
Statistical summary of farm inventory was slightly delayed, but served as basis for selection of farms and plots for arthropod sampling. Arthropod sampling in 2002 produced very high quality samples and the second sampling was omitted.
Deliverable 23 was submitted in Sept. 2002, but first published May 2003.

WP 4

The yearly Plant Protection Conference has terminated and the planned presentations will be considered in other fora. Digitising the model landscape has been more time consuming than first expected and consequently delays scenario running. However, the contributions to CC_7 (0304) and the Workshop in May 04 (CC_8) are expected to be on time.

WP 5.
Most of the tasks in WP 5 have been delayed for almost a year due to serious illness. An anthropologist will be hired to the interviews planned to take place in autumn 2003, and data collection, analysis and indicator identification is expected to be finished in time for CC_2, CC_3 and for the workshop in May 2004 (CC_8).

E. Project publications and other products

1. Articles in international, scientific journals with review procedures

Aude, E. Tybirk, K. & Pedersen, M.B. **In Press. Vegetation and diversity of conventional and organic hedgerows. Agric. Ecosyst. Env..

Aude, E., Tybirk, K., Michelsen, A., Ejrnæs, R., Hald, A.B., Mark, S. **Accepted. Conservation value of spontaneous vegetation in hedgerows – does organic farming make a difference? Biol. Conserv.

*Demšar, D., Džeroski, S., Larsen, T., & Krogh, P.H. (**submitted**, 2003). Identifying the most important agricultural factors for the soil community of microarthropods. In: International Electrotechnical and Computer Science Conference, 25. - 26. September 2003, ERK'2003, Ljubljana.

Aude, E. & Ejrnæs, R. 2003. Bryophyte colonisation and persistence in experimental grassland dominated by vascular plants Deposited 18 September 2003 no.1293: **Submitted** to Oikos.

Ejrnæs, R. 2003. Discrimination of semi-natural plant communities from abandoned fields by ordination and neural networks Deposited 18 September 2003 no 1295: **Submitted** to Applied Vegetation Science:

Frederiksen P. and V. Langer (**submitted**): Localisation and Concentration of organic farming in the 1990's – the case of Denmark. Tijdschrift voor economische en sociale geografie.

Lövei, G.L.; Toft, S. and Axelsen, J.A. (**submitted**). Composition and diversity patterns in spring-active ground beetle (Carabidae) assemblages in relation to soil management in organic wheat fields in Denmark. *Proceedings from the 11th European Carabidologist Meeting 2003, 21 – 24 July, Århus, Denmark*.

Petersen, S.; (**in prep**) Effects of organic farming on flies in Danish field boundaries.

Petersen, S.; **(in prep**). Vegetation in Danish field boundaries: A comparative study related to effects of agricultural practices.

Tybirk, K., Alrøe, H.F & Frederiksen, P. 2003. Nature quality in organic farming: A conceptual analysis of considerations and criteria in a European context . **Submitted** to J. Agr & Env. Ethics

Tybirk, K. Olsen, H.K. Primdahl, J. Holbeck, H.B. **in revision.** Farm Nature Conservation Plans – experiences from Northern Europe. Landscape & Urban Planning

2. Papers presented at congresses, symposiums, etc.

Frederiksen P. and Langer V. 2004 (**In.prep**.): Diversity measures in organic farming in Denmark. Paper submitted to the 6th symposium on Farming and Rural Systems research and Extension, Vila Real, Portugal, 3-8 April 2004

Fredshavn, J and Tybirk K., 2004. (**In prep**.) Aspects of research on nature quality in farming systems. Paper submitted to the 6th symposium on Farming and Rural Systems research and Extension, Vila Real, Portugal, 3-8 April 2004

Langer V. and Frederiksen P. 2004 (**In. prep**.): Farm scale nature practise in Danish organic farms. Paper submitted to the 6th symposium on Farming and Rural Systems research and Extension, Vila Real, Portugal, 3-8 April 2004

Levin, G. & Frederiksen, P.2003 Beschreibung und Differenzierung der dänischen Agrarlandschaft anhand von räumlichen Strukturindexen. Poster presented at the IALE Struktur Workshop Landschaftsstruktur Analysieren, Verstehen, Modellieren , Salzburg, Austria, 16-17 April 2003.

Lövei, G.L.; Toft, S. and Axelsen, J.A. Composition and diversity patterns in spring-active ground beetle (Carabidae) assemblages in relation to soil management in organic wheat fields in

Denmark. *Poster at the 11th European Carabidologist Meeting 2003, 21 – 24 July, Århus, Denmark*.
*Noe, E., 2002. Folks oplevelser af naturen og ønsker til biodiversitet?. Statuskonference 6. Marts 2002, Nyborg Strand. : Biodiversitet i det dyrkede land og dets omgivelser 29-30.
*Noe, E., 2002. Natur og miljøforvaltning baseret på frivillige aftaler. I: Natur- og Miljøforskningskonference 2002. ISBN 87-7772-681-2. 227-228.
*Noe, E., 2003. Farm management, knowledge and multidimensional farming - som reflections from the perspective of farm enterprises as heterogeneous self-organising systems. ESRS Congress August 18-22, 2003, Sligo, Ireland. 8pp.
Tybirk, K & Fredshavn, J. 2003.. Naturkvalitet i økologisk jordbrug – koncept og foreløbige resultater. DJF rapport nr. 89 (2003), 189-198.
Tybirk,K., E. Aude & M.B. Pedersen 2003. Naturindholdet i hegn på økologiske og konventionelle bedrifter. DJF-rapport 89 (2003): 213-226

3. Reports, articles in agricultural journals, etc.

Ackermann. H. Ø. (2003): Organic farmers' landscape management. Masters Thesis (University of Copenhagen, Dept. of Geography) submitted for evaluation.
*Tybirk,K, Ejrnæs, R. Elmegaard N., Langer, V, Holmstrup, M., 2003. Nature Quality and Biodiversity In Holmstrup, M. (Ed.) Does Organic farming make a difference? Gads Forlag.
Tybirk,K., E. Aude & M.B. Pedersen 2003. More biodiversity in hedges in Organic farming. (Mere natur i økologiske hegn), Vand og Jord 10(3): 93-96.

4. Oral presentations, public meetings, field days, etc.

Baudry, J., Kristensen, S., Tybirk, K., Kristensen, L. S., Thenail, C., Busck, A.G., Le Du-Blayo, L., Luginbühl, Y, Kergreis, S. 2003. A comparison of hedgerow patterns and landscape connectivity. Oral presentation, IALE Congress, Darwin, July 2003
Ejrnæs, R. 2003. Silent or stupidized?- Why is biodiversity low political priority? *Oral presentation at ALMA-annual meeting, Gilleleje Kursuscenter 14.-16. september.*
Krogh, P.H. Course on "Analysis of environmental data with machine learning methods" Ljubliana 22-25. April 2002.
Krogh, P.H. 2002."Soil environmental applications of machine learning". Oral presentation at seminar on "Analysis of environmental data with machine learning methods" 22.-25. April 2002, Ljubljana, Slovenia.
Levin. G., 2002: A holistic framework for the analysis of landscape changes following organic farming. Assignment for Ph.D. course: Research Methodologies in relation to Principles and Practice of Organic Agriculture. October 7-11, 2002 in Tisvildeleje, Denmark.
Levin, G., 2003: A methodological framework for analysing landscape dynamics in relation to organic farming. PPT-presentation at Ph.D. course: Crossing the boundary between natural and social science. August 18-20, 2003 in Copenhagen, Denmark.
Levin, G., 2003: The effects of organic farming on the landscape: Reflections on a Ph.D. project in the context of values and ideologies. Assignment for Ph.D. course: Values, ideologies, science and organic farming. September 12-17, 2003 in Falkenberg, Halland, Sweden.
Tybirk K. 2002. How does agricultural production systems affect botanical diversity in semi-natural areas? Oral presentation at Danish conference on biodiversity in agricultural land.
Tybirk, K. & Ejrnæs, R. 2003. Thematic day for journalists: Interaction of farming and nature conservation from Farm-Nature Conservation Plans to National parks. 12 Participants.
Tybirk, K. 2003. Project homepage established (http://www.dmu.dk/1_Viden/2_Miljoe-tilstand/3_natur/nk-oj/default.asp)
Tybirk, K. 2002. How is agricultural production affecting botanical diversity in the agricultural landscape Oral presentation at Seminar on Biodiversity, Nyborg Stand, March 2002

F. Scientific education

Ph.d. studies:

Aude, E. (University of Copenhagen). Project entitled Habitat quality and recruitment limitations in the agricultural landscape. To be submitted ultimo 03. Partly financed by DARCOF.
Gregor Levin: Landscape changes following conversion to organic farming: To what extent and how?

MSc. projects:

Sune Petersen (University of Copenhagen) : Impact of Organic Farming Period on Flies and Vegetation of Field Borders (terminates 11.03)

Lene Møller, (University of Aarhus). Project title: The Effect of Different Types of Mulch Layers on Soil Fauna and Polyphagous Predators. Expected to terminate by the end of 2003.

Anders N. Stidsen (University of Aarhus): Old Grown hedges in an organic farming landscape (terminates ultimo 03)

Marie Louise Risgaard (Royal Veterinary and Agricultural University): Processes of Re-Conversion (working title, terminates 04))

Henrik Ackermann (University of Copenhagen): Organic farmers' Landscape Management (examinations 1. Oct.)

G. National and international co-operation

WP 2: Vibeke Langer, RVAU was a guest researcher at Lincoln University, New Zealand Nov 2002 March 03.

WP 3: Collaboration with Jacques Baudry's group from INRA-SAD Armorique, Ecobio lab of CNRS/Rennes University on social and biological values of hedges in the organic and conventional landscapes.

WP 4: Co-operation with the EU funded project www.ECOGEN.dk involving decision support experts: Sašo Džeroski, Damjan Demšar, Marko Bohanec, Jožef Stefan Institute, Department of Intelligent Systems, Slovenia.

H. Critical reflection on the project

New and interesting results in the project have brought attention to research areas not originally anticipated in the application. Delays in some of the work packages may prevent us from having a full overview of ideas and results at the workshop in May 2004 originally planned to identify correlation's of nature quality and recommendations for the future work.

- Statistical information on organic farming in Denmark has given rise to new questions on the localisation and conversion of farms. Why are more than 1/3 of the Danish parishes without organic farms and what are the reasons that farmers re-convert to conventional agriculture? The local socio-cultural context and dynamics may contribute to further understanding of these questions.

- Research in nature quality on the non-cultivated areas was reduced significantly in the final approval of the project. However, remarkable results on the interaction between these areas and the cultivated areas have shown that organic farming has a strong impact on the vegetation and the arthropods of field borders and hedges. Three to five years after conversion the differences are significant, and the impact is increasing after 10 -15 years. This indeed challenges the established theories on colonisation limitations in the farming landscape and will give rise to new speculations on the role of organic farming as a mean to protect nature in the agricultural landscape.

- From a nature conservation point of view the small uncultivated biotopes of the farming landscape are very important. From a quantitative point of view the large areas of cultivated land represents important nature quality. Both areas contribute importantly to nature quality in the farmed landscape, and it is important to continue developing both aspects in the future organic agriculture. The Dutch Natural Capital Index is an interesting approach to this way of thinking that is able to combine both axes.

- The delays in WP 2 and WP 5 are expected to be recovered in the last period of the project, but it will complicate some of the planned cross-disciplinarity of the project. Especially at the two planned workshops (CC_8 and CC_9) in May and November it is crucial to have a full overview of results and ideas to identify correlation's and indicators. We therefore consider to postpone these workshops up till 6 months, which will allow us to include all delayed and originally planned late work in the project conclusion.

8. Budget

A. Account for any change in budgets

Under each institutional budget, minor changes are described and the requests for each change are summarised into the budget for the whole project in 8.B.
In general some delays in specific activities interact on other activities and consequently budgetary adjustments have been necessary.

B. Budget for the whole project (1.000 DKK)

Total consumption of funds from DARCOF and expected consumption this year and coming years

Year:	Consumption before 2003	Expected consumption 2003	rev. 2004	Total
Man-months				
Scientific personnel	38	54	45	136
Technical personnel	19	21	8	48

Year:	Consumption before 2003	Expected consumption 2003	rev. 2004	Total
Salaries				
Scientific personnel	1446	2042	1824	5.311
Technical personnel	580	654	284	1.518
Other operational costs	221	184	185	590
Equipment	3	74	0	77
Others (please specify)				
Direct costs	2250	2954	2293	7.497
Indirect costs (20% of direct costs)	450	591	459	1.499
Total	2700	3544	2752	8.996

Comments:
In general the project is in good progress and a recovering of the described delays seems realistic in 2004. However, a postponement of the final workshop into 2005 may also require a later transfer of funds into 2005.

9. Signatures and stamps

Name	Institute	Date	Signature
Head of project			

Appendix I. Detailed budget

A. Budget for each participating institute (1.000 DKr)

Name of Institute: NERI- Dept. of Wildlife Ecology and Biodiversity

Year:	Consumption before 2002	Expected consumption 2004	rev. 2004	2005	Total
Man-months					
Scientific personnel	18,65	14,50	12,23		45,38
Technical personnel	7,50	1,00	1,00		9,50

Year:	Consumption before 2003	Expected consumption 2003	rev. 2004	2005	Total
Salaries					
Scientific personnel	755	580	507		1843
Technical personnel	233	30	30		293
Other operational costs	3				3
Equipment	93	44	96		233
Others (please specify)					
Direct costs	1084	654	633		2372
Indirect costs (20% of direct costs)	217	131	127		474
Total	1301	785	760		2848

Comments:
Is anticipated that the co-ordination and exchange of information between the project participants will be extremely crucial for obtaining the expected results of the planned Cross-cuttings. Therefore, it is requested to convert some of the lower expenditures into salary for the final project phases as indicated in the revised budget.
The work on scenarios (WP 4) has been postponed with up to one year. Unspent resources from 2003 are requested to be transferred to 2004 as indicated in the revised budget.

A. Budget for each participating institute (1.000 DKr)

Name of Institute: NERI, Department of Policy Analysis

Year:	Consumption before 2003	Expected consumption 2003	2004	2005	Total
Man-months					
Scientific personnel	9,19	9,5	10,1		
Technical personnel	1,33	1	1		

Year:	Consumption before 2003	Expected consumption 2003	2004	2005	Total
Salaries					
Scientific personnel	358	379	416		1153
Technical personnel	34	29	30		93
Other operational costs	57	50	40		147
Equipment		22			22
Others (please specify)					
Direct costs	449	480	486		1415
Indirect costs (20% of direct costs)	90	96	97		283
Total	540	576	583		1,699

Comments:
One man-month is sought transferred to 2004, due to above explained delays. 20 kkr is sought transferred due to expected conference participations in 2004.

Name of Institute: Natural History Museum, Århus

Year:	Consumption before 2003	Expected consumption 2003	rev. 2004	Total
Man-months Scientific personnel Technical personnel	2,00	5,00	1	8

Year:	Consumption before 2003	Expected consumption 2003	rev. 2004	Total
Salaries Scientific personnel Technical personnel	51	127	32	210
Other operational costs	15	15		30
Equipment				
Others (please specify)				
Direct costs	66	142	32	240
Indirect costs (20% of direct costs)	13	28	7	48
Total	79	170	39	288

Comments:
Due to the delayed analyse of the material/data some resources are expected to be transferred to and spend in 2004 .

Name of Institute: NERI- Dept. of Terrestrial Ecology

Year:	Consumption before 2003	Expected consumption 2003	rev. 2004	Total
Man-months				
Scientific personnel	5,5	6,3	4	16
Technical personnel	3	7	2	12

Year:	Consumption before 2003	Expected consumption 2003	rev. 2004	Total
Salaries				
Scientific personnel	130	258	168	556
Technical personnel	120	217	64	401
Other operational costs	25	30	10	65
Equipment				
Others (please specify)				
Direct costs	275	505	242	1022
Indirect costs (20% of direct costs)	55	101	48	204
Total	330	606	290	1226

Comments:

In addition to this, 18 kkr were spent in TERI during 2002 as co-financing the activity.

Name of Institute: Aarhus University, Institute of Biology, Dept. of Zoology

Year:	Consumption before 2003	Expected consumption 2003	rev. 2004	Total
Man-months				
Scientific personnel		12,50		12,50
Technical personnel	1	4		5,00

Year:	Consumption before 2003	Expected consumption 2003	rev. 2004	Total
Salaries				
Scientific personnel		380		380
Technical personnel	30	90		120
Other operational costs		52		52
Equipment				0
Others (please specify)				
Direct costs	30	522		552
Indirect costs (20% of direct costs)	6	104		110
Total	36	626		662

Comments:

Name of Institute: DIAS, Danish Institute of Agricultural Science, Dept. of Plant Protection, Flakkebjerg

Year:	Consumption before 2003	Expected consumption 2003	rev. 2004	Total
Man-months				
Scientific personnel	2,5	3		6
Technical personnel	3,5	4		8

Year:	Consumption before 2003	Expected consumption 2003	rev. 2004	Total
Salaries				
Scientific personnel	95	120		215
Technical personnel	105	124		229
Other operational costs	15	20		35
Equipment				
Others (please specify)				
Direct costs	215	264		479
Indirect costs (20% of direct costs)	43	53		96
Total	258	317		575

Comments:

Name of Institute: DFLRI: Danish Forest and Landscape Research Institute

Year:		Consumption before 2003	Expected consumption 2003	rev. 2004	Total
Man-months Scientific personnel Technical personnel		1	5	10 2	16 2

Year:		Consumption before 2003	Expected consumption 2003	rev. 2004	Total
Salaries Scientific personnel Technical personnel		39	208	424 72	670 72
Other operational costs		5	10	24	39
Equipment					
Others (please specify)					
Direct costs		44	218	520	782
Indirect costs (20% of direct costs)		9	44	104	156
Total		53	261	624	938

Comments: As a series of tasks, originally planned for 2003, have been postponed, the original budgetary plan will not be fulfilled. DFLRI would like the budgetary surplus to be transferred to the following year, as indicated in the above, revised budget.

Name of Institute: DIAS, Danish Institute of Agricultural Science, Dept. of Agricultural Systems, Foulum

Year:	Consumption before 2003	Expected consumption 2003	rev. 2004	Total
Man-months				
Scientific personnel	1,75	2,50	8	12
Technical personnel	0,25	1,50	1,5	3

Year:	Consumption before 2003	Expected consumption 2003	rev. 2004	Total
Salaries				
Scientific personnel	68,75	116	309	494
Technical personnel	7	37	56	100
Other operational costs	11	15	15	41
Equipment				
Others (please specify)				
Direct costs	86,75	169	380	635
Indirect costs (20% of direct costs)	17,35	33	76	127
Total	104,10	202	456	762

Comments: As a series of tasks, originally planned for 2003, have been postponed to 2004. DIAS-Foulum would like the budget to be adjusted, as indicated in the above, revised budget

B. Budget for each participating department (1.000 DKK)

Name of Institute and department:

Year:	Consumption before 2002	Expected consumption 2002	2003	2004	2005	Total
Man-months Scientific personnel Technical personnel						

Year:	Consumption before 2002	Expected consumption 2002	2003	2004	2005	Total
Salaries Scientific personnel Technical personnel						
Other operational costs						
Equipment						
Others (please specify)						
Direct costs						
Indirect costs (20% of direct costs)						
Total						

Comments:

C. Budget for co-financing from each participating institute (1.000 DKK)

Name of Institute:
WP2 “Interdisciplinær forskning og undervisning i økologiusk jordbrug – læring i et tværfagligt og målorienteret miljø” with RVAU, Dept. of Organic Agriculture

Year:	Consumption before 2003	Expected consumption 2002	2004	2005	Total
Man-months Scientific personnel Technical personnel	10	4	4		18

Year:	Consumption before 2002	Expected consumption 2003	2004	2005	Total
Salaries Scientific personnel Technical personnel	400	160	160		720
Other operational costs	160	90	90		360
Equipment					
Others (please specify)					
Direct costs	580	250	250		1080
Indirect costs (20% of direct costs)	116	50	50		216
Total	696	300	300		1296

Comments: