FUTMON
forest monitoring for the future

Improvements of data quality assurance in the FutMon laboratories

Nils König

Northwestern German Forest Research Institute
Goettingen, Germany

a Life+ co-financed project for the "Further Development and Implementation of an EU-level Forest Monitoring System".

The project coordination centre is situated at the Institute for World Forestry, Hamburg, Germany.

Many laboratories are working within the FutMon project:

Kind of laboratories	Number of FutMon Labs
Labs for water analysis (deposition, soil solution)	41
Labs for plant analysis (foliage, litterfall, vegetation)	36
Labs for soil analysis (soil, humus layer)	38
Labs for soil physics analysis	25
Total number of FutMon Labs	**63**

These Laboratories from 24 different European countries are producing hundreds of thousands analytical results each year!

For the comparability of these data all over Europe it is very important:

- to use correct analytical methods
- to use the same or comparable analytical methods
- have a good laboratory practise in all labs

Therefore within the FutMon Project a Working Group for Quality Assurance and Control in Laboratories was installed to continue the work of a similar group within ICP Forests.

The aims of the Working Group QA/QC in Labs are:

- harmonisation of analytical methods, installation of reference methods
- rejection of unsuitable analytical methods
- contineous revision of the manuals
- organisation of help for labs with analytical problems
- organisation of meetings with the heads of the labs
- organisation of ring tests

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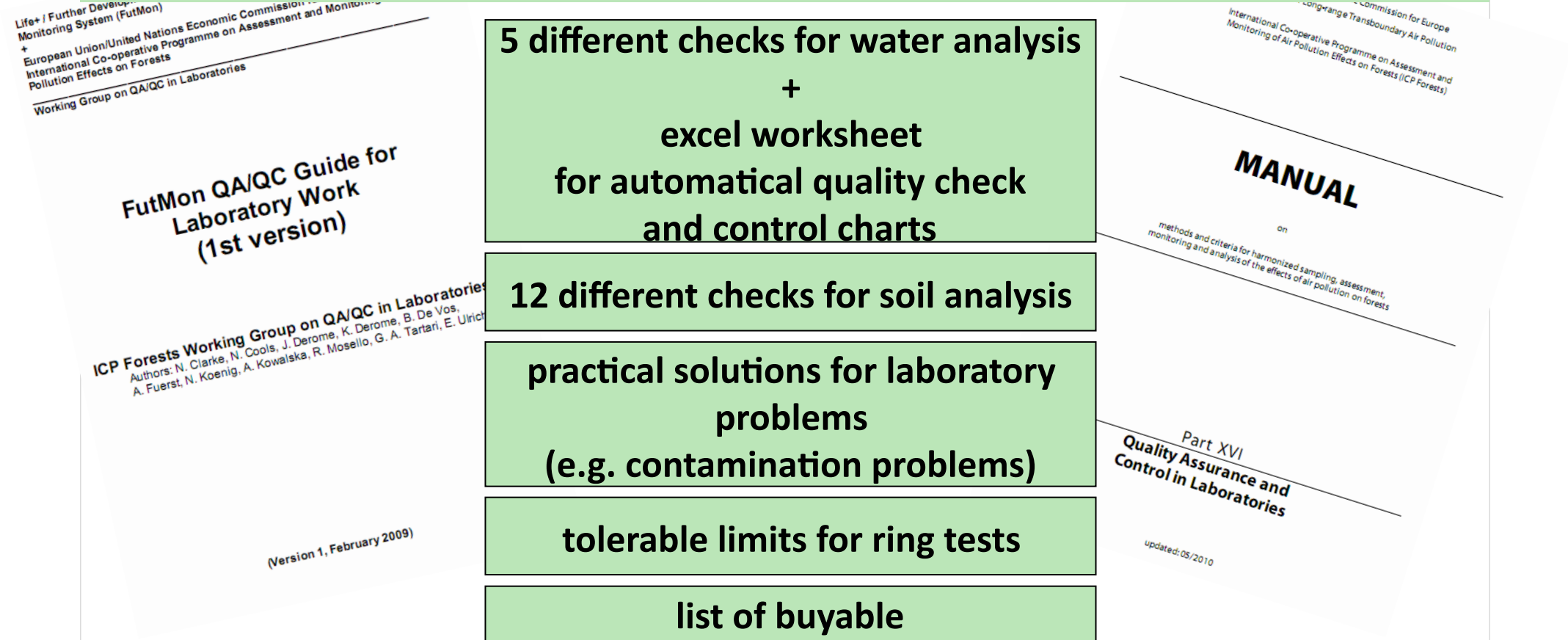
manual with practical help for the laboratory work:



5 different checks for water analysis
+
excel worksheet
for automatical quality check
and control charts

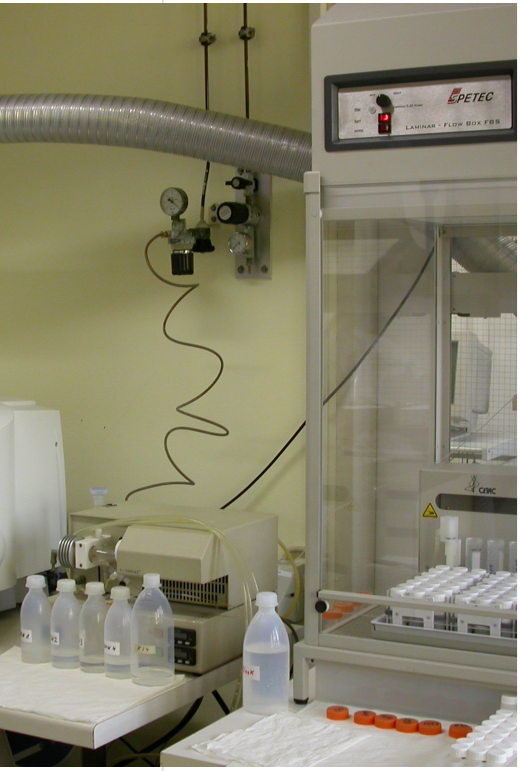
12 different checks for soil analysis

practical solutions for laboratory problems
(e.g. contamination problems)

tolerable limits for ring tests

list of buyable
certified refrence materials

Exchanging of analytical knowledge

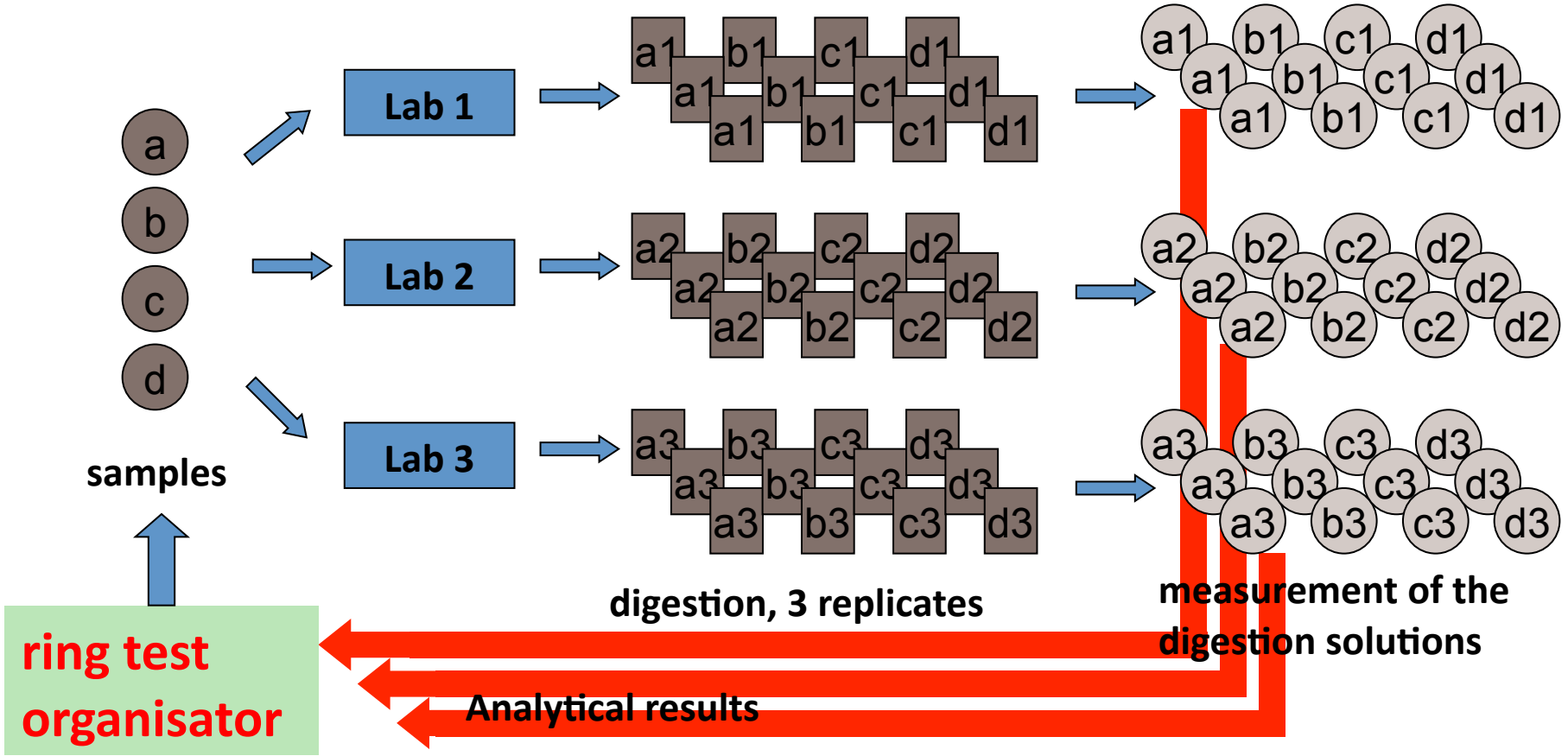


- helping programme with bilateral visits of the labs and active help
- Installation of an internet platform for actual analytical questions and help to each other
- 2 meetings of the heads of the labs with more than 50 presentations about analytical methods, problems and solutions

Ring tests are the best method to proof the quality of the labs

- The most important step to force quality assurance and control was the introduction of regularly ring tests for water, soil and plant samples.
- In the meantime **6 soil, 5 water and 13 foliar ring tests** have been organized within the ICP Forests program and FutMon project.
- Within the FutMon project the participation in ring test became **mandatory**.
- From the results of these ring tests **the development of quality** in the labs can be seen.

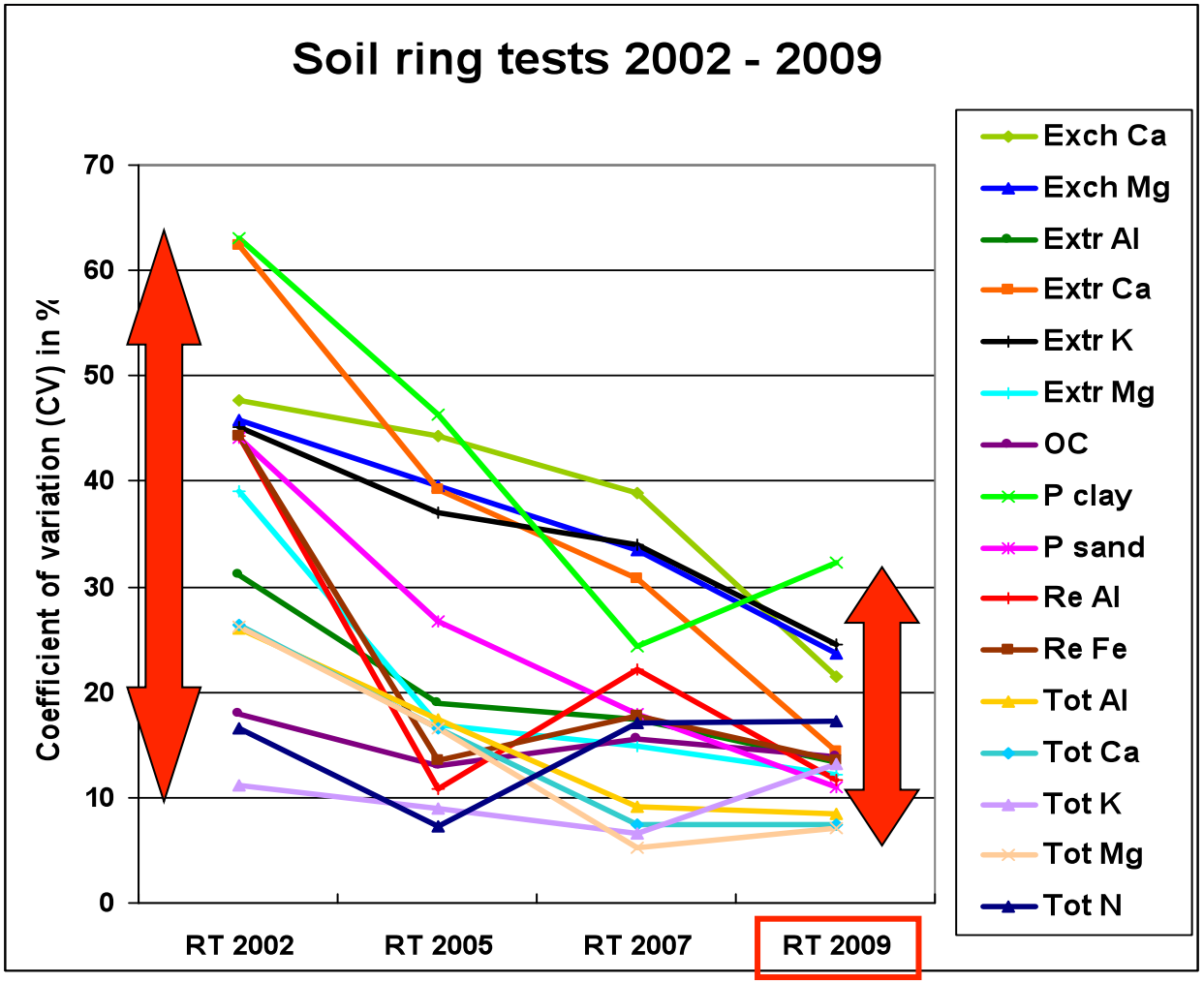
Ring tests are the best method to proof the quality of the labs:



Ring test programme of the FutMon project:

ring test	year		
	2009	2010	2011
soil	x		
foliage	x	x	x
water	x	x	x
soil physics	x		

Mean coefficient of variation between labs



most important soil analysis parameters

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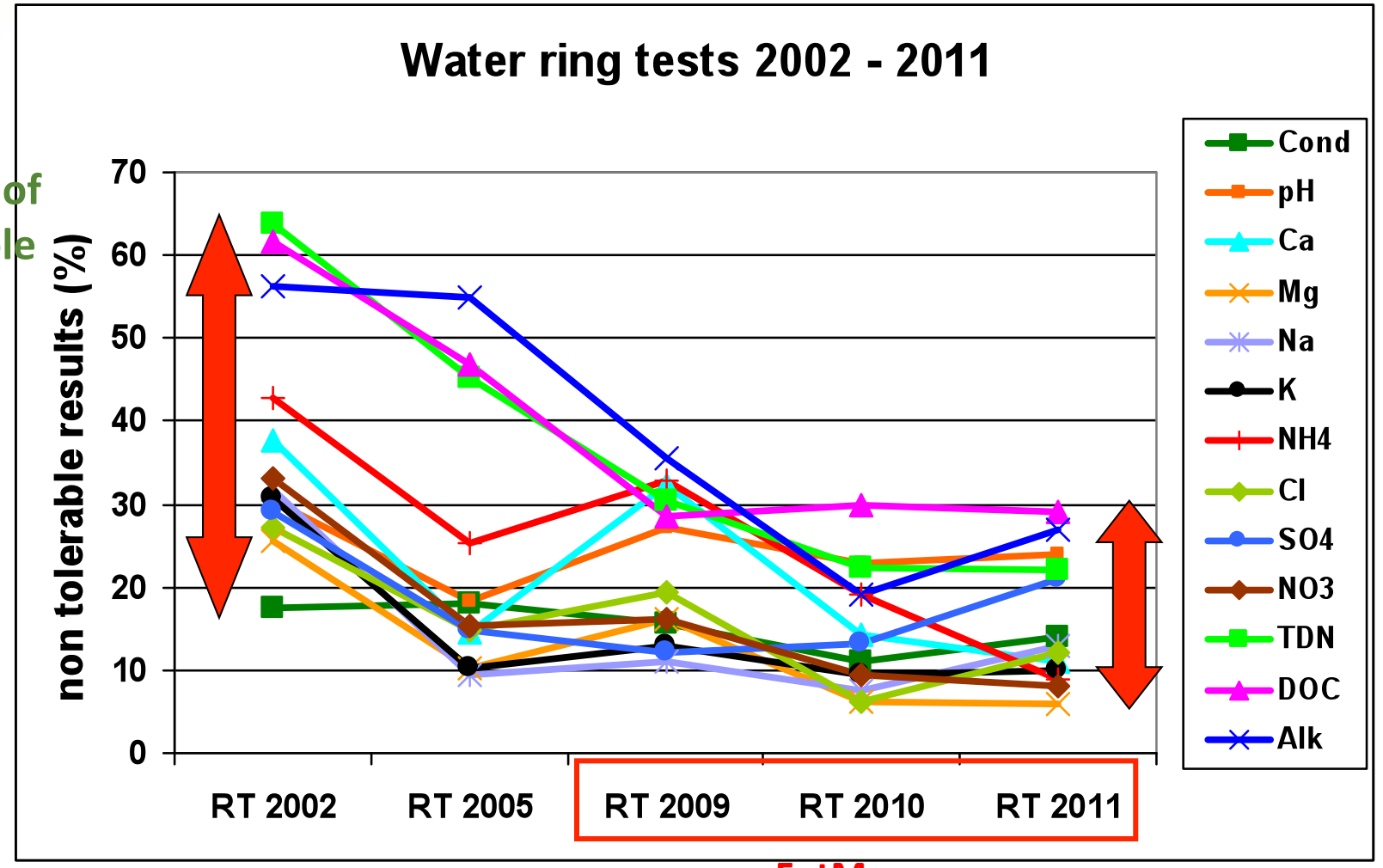
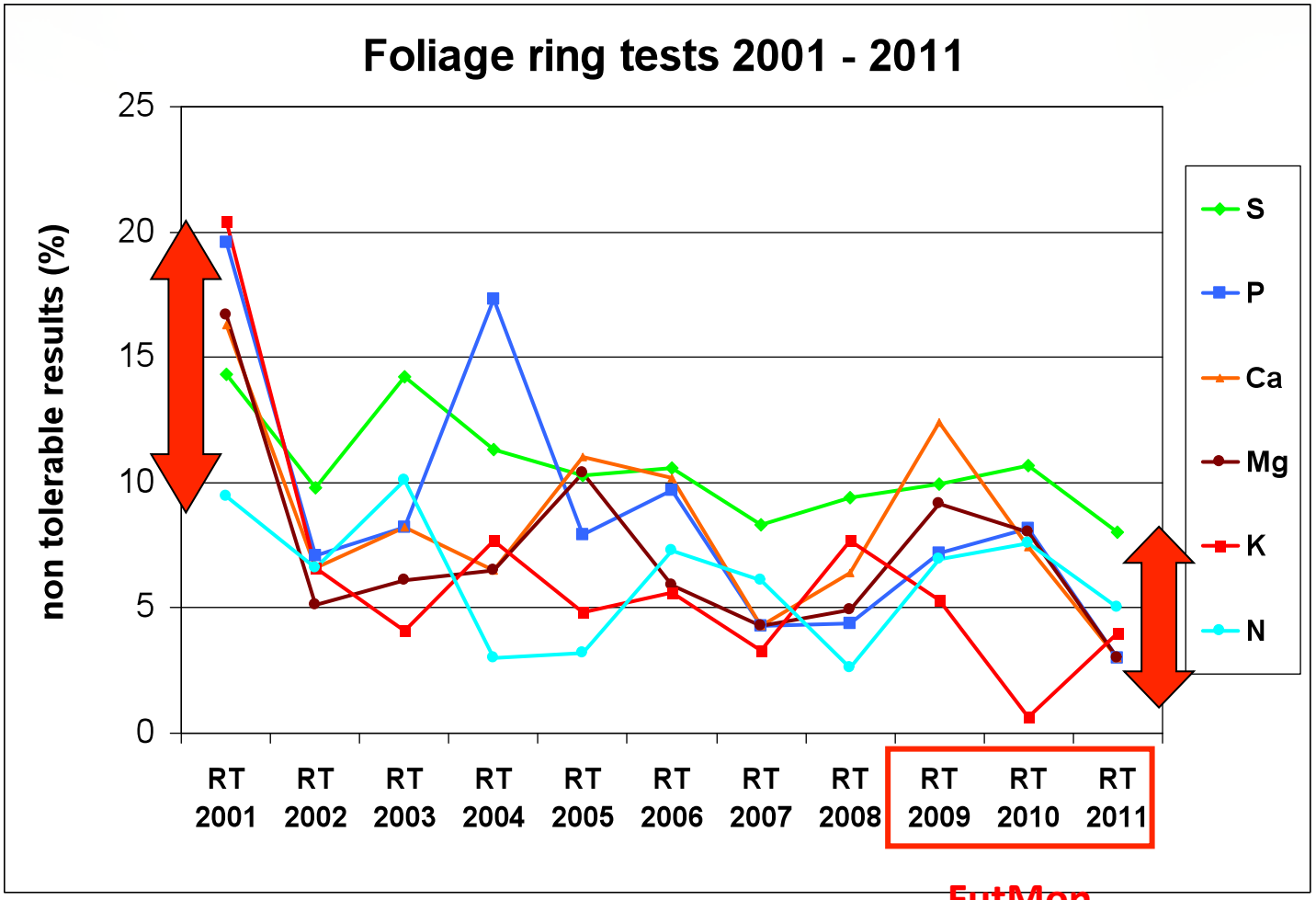
Percentage of non tolerable results



Percentage of non tolerable results

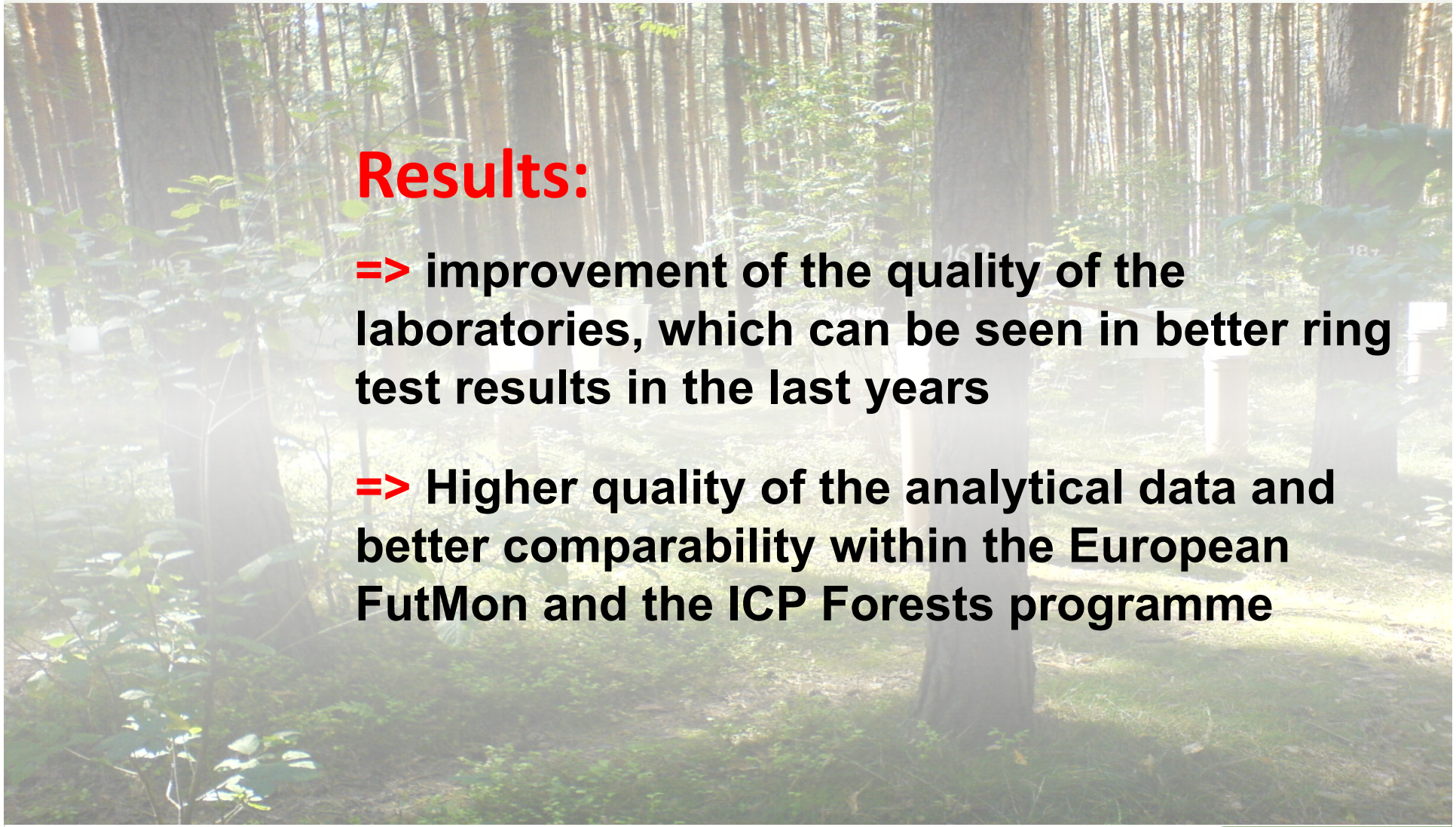


Conclusions:

- **Reference method descriptions and a list of usable determination methods for all parameters in the FutMon manuals**
- **Comprehensive FutMon QA/QC guide for laboratory work with different quality checks, help files etc.**
- **Helping program for laboratories with unacceptable ring test results**
- **Regularly meetings of the heads of the labs and a Working Group QA/QC for exchange of analytical information**

Conclusions (cont.):

- Mandatory ring test program with water, plant, soil and soil physics ring tests and defined tolerable limits for all parameters
- Laboratory qualification system by ring tests with a requalification procedure for labs with unacceptable ring test results and final qualification reports
- Special data reporting forms for method and quality information (lab code, ring test participation and results, control chart results etc.) directly linked to the analytical results in the data base



Results:

=> improvement of the quality of the laboratories, which can be seen in better ring test results in the last years

=> Higher quality of the analytical data and better comparability within the European FutMon and the ICP Forests programme

Thank you for your interest!