

## Inspection of sprayers in Germany – results and experience over the past decades

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### Summary

Voluntary inspections of field sprayers have been offered in the Federal Republic of Germany since the end of the sixties and for air-assisted sprayers for orchards, vineyards and hops since the mid eighties. As a result, Germany has gathered plenty of experience with the inspection of plant protection equipment. The inspections were based on uniform inspection requirements (BBA Guideline 1-3.2.1) and are carried out in about 1000 recognised workshops in about 2000 places. Workshops must be officially approved and use in most cases test facilities which have been approved by the BBA. Up to 1993 around 30 000 sprayers were inspected every year; in the meantime -after the introduction of the obligatory inspection of field sprayers in 1993- the number of inspected sprayers has increased to about 63 000 per year. The inspection fee for field sprayers increased from 40 € per inspection in the year 1992 to 130 € in the year 1994 and to at last 145 € in the year 2003. Dripping nozzles, faulty manometers and unsatisfactory distribution were often the reason for not meeting minimum requirements. Future activities will be harmonising the national sprayer inspection with the European norm EN 13790.

### 1. Introduction

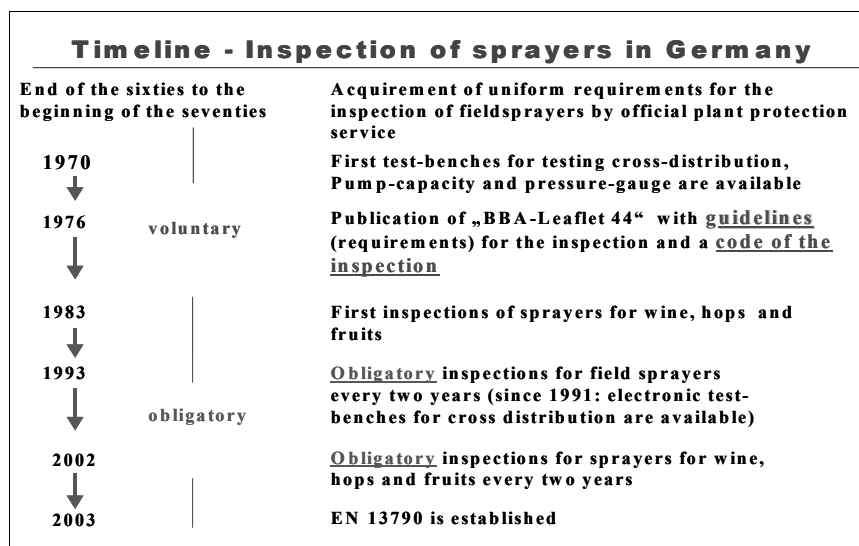


Figure 1: Timeline – Inspection of sprayers in Germany.

Already in 1970 the first test facilities for the testing of field sprayers were available. Still, from the beginning, all inspections were based on uniform inspection requirements throughout Germany which were published in BBA - leaflet 44. The guideline contains requirements for inspection, a code of inspection, an example of an inspection protocol, an example of a control label and a kind of code for approval of workshops. Workshops for agricultural equipment were and still are recognised workshops where the inspections are carried out on a regular basis. At present there are about 1000 inspection workshops which inspect plant protection equipment in about 2000 places. These inspection workshops

are officially approved by the official plant protection authorities of the federal states (“Länder”) in accordance with the code of approval.

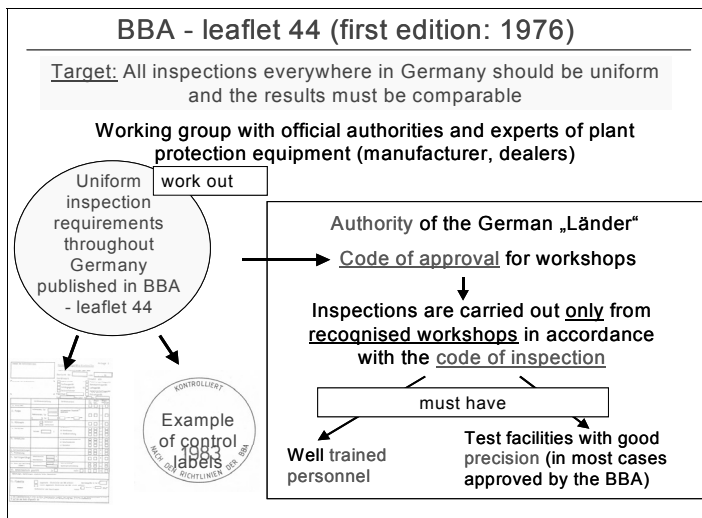


Figure 2: Workshop of the BBA – leaflet 44 with the target of uniform inspections and comparable results.

The approved workshop must be able to show evidence of trained personnel and perform the inspections according to a uniform code of inspection. In most cases, only test facilities which have been approved by the BBA for the respective measuring task are used for the inspections.

## 2. The situation today – results and experience

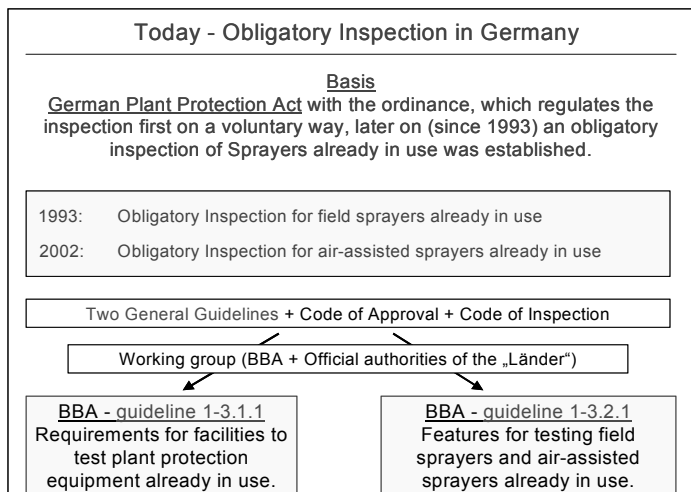


Figure 3: Situation today – Obligatory inspection in Germany.

In the year 1983 the voluntary inspection of air-assisted sprayers started and changed to an obligatory inspection in the year 2002. The requirements for plant protection equipment already in use (Guideline 1-3.2.1 'Features for testing field sprayers and air-assisted sprayers already in use') were established by a working group consisting of representatives at the official plant protection service from the various federal states led by the BBA. These requirements are constantly adjusted to meet new technological developments and were last amended in December 2001. The BBA guideline 1-3.2.1 contains the main features for testing field sprayers and air-assisted sprayers already in use.

Sprayer parts to be tested are

- Drive - protection device for power transmission.
- Pump - capacity, leakage, pulsation, pressure-relief device.
- Agitator - clearly visible agitation.
- Tank – no leakage, strainer in the tank dome, filling devices, collection at the outlet.
- Controls – no leakage, function, readable during work, pressure gauge – accuracy.
- Pipe-system – no leakage, no marks of bending.
- Filtering – suction filter, pressure line filter.
- Spray boom – stable design, no deformation or deflection, no liquid shall be sprayed onto the sprayer itself.
- Nozzles – all nozzles the same type, no dripping, cross distribution.
- Blast – no deformation or corrosion.

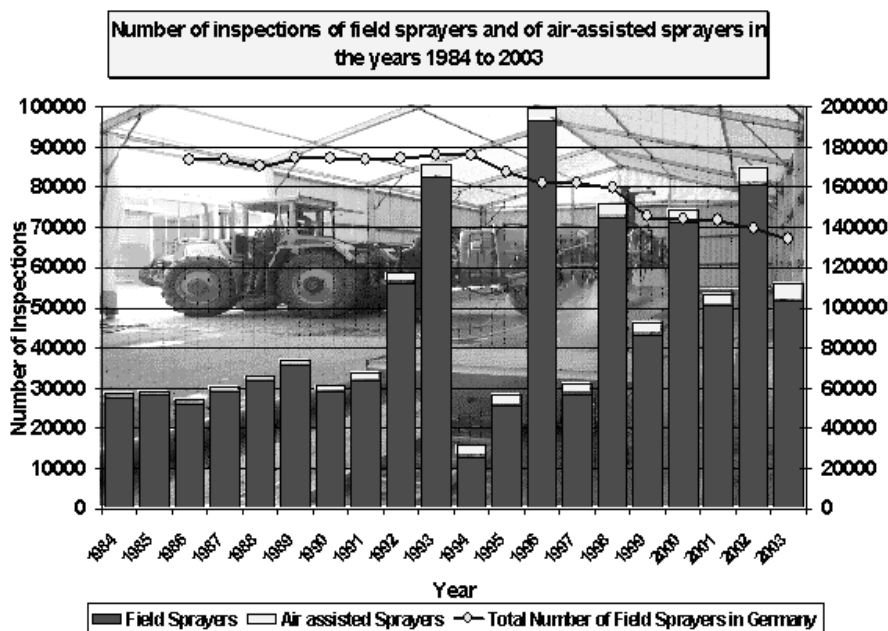


Figure 4: Number of inspections and total number of field sprayers in Germany.

Following the introduction of the obligatory inspection for field sprayers in 1993 and for air-assisted sprayers in 2002, there was a sudden increase in the total amount of inspections carried out. Up to 1993,

around 30 000 field sprayers were inspected; in the meantime, this number has increased to almost 63 000 per year. With the introduction of the obligatory inspection a transition period of 3 years took place. Sprayers which are inspected in 1993 have got a period of 3 years until the next cycle. The transition period is the reason for the big increase of the inspection numbers in the year 1996 and in the following two-year periods (1998, 2000 and 2002). The effect of the structural change in farming (number of farms decrease and farm areas increase) may be the reason for the decrease of total numbers of field sprayers in Germany from 170 000 in the year 1986 to 130 000 sprayers in the year 2003.

For air-assisted sprayers, the extent of inspections remained fairly constant over the years at around 3000 inspections per year. However, it is expected that, because inspections have been compulsory since 2002, there will be a definite increase in the number of inspections carried out annually in the years to come.

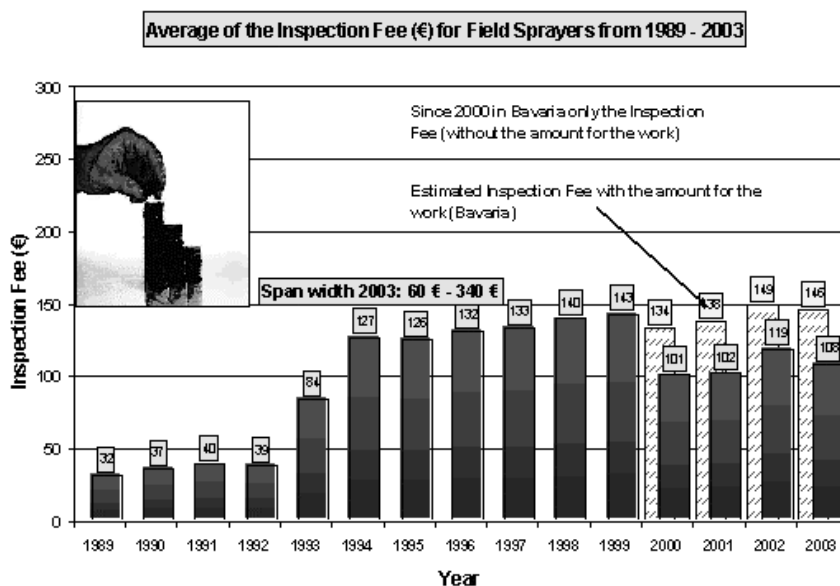


Figure 5: Average inspection fee for field sprayers.

The inspection fee for field sprayers increased from 40 € per inspection in the year 1992 to 130 € in the year 1994 (after introduction of compulsory inspections) to at last 145 € in the year 2003. One reason for the increased inspection fee may be, that the inspection workshops invested in new test facilities, for example, equipment for measuring the cross distribution.

Originally, dripping nozzles, faulty manometers and unsatisfactory distribution were often the reason for not meeting minimum requirements; today this is also often due to controls, pipe systems and spray booms.

### Defects at Field Sprayers in the years 1993 and 2003

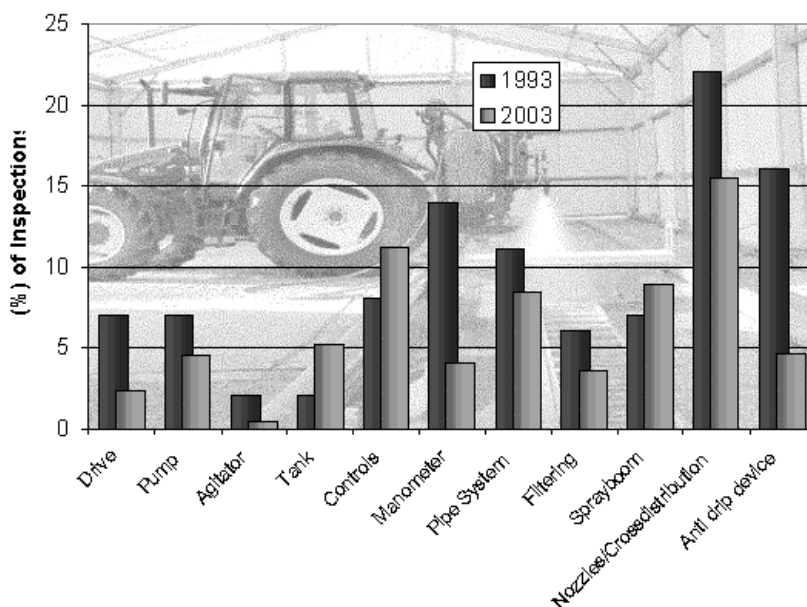


Figure 6: Defects of field sprayers 1993 in relation to 2003.

The measuring of the cross distribution is in Germany a central instrument to guarantee the spray quality and the chemical application later on in the field. Defects at the cross distribution decreased continually to at least round about 15 % of the inspected sprayers. The knowledge and the training of farmers are going to be better and nozzles with poor spray quality are changed earlier then 20 years ago.

### Defects at the cross distribution

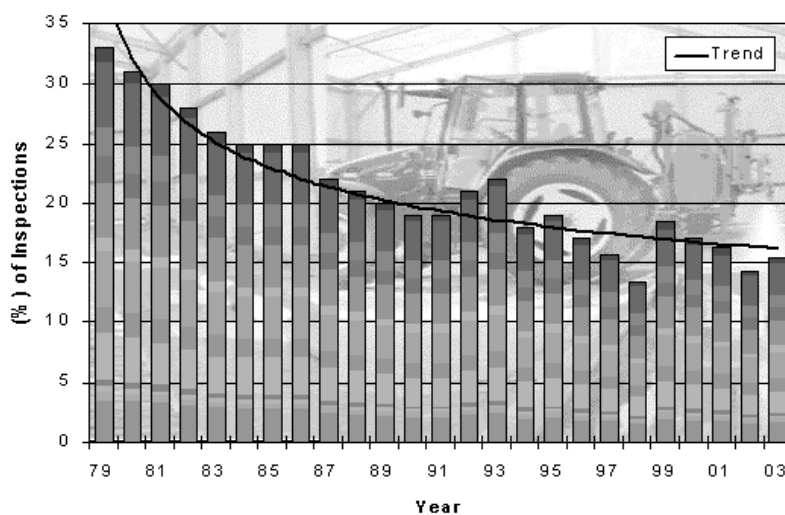


Figure 7: Cross distribution defects.

### 3. Conclusions

Basis for the inspections in Germany is the Plant Protection Act with the ordinance. A working group with members of the BBA and official authorities of the German federal states work out requirements for facilities and features for testing sprayers already in use. Inspection workshops must be recognised corresponding to the code of approval and carry out the inspections in accordance with the code of inspection. Inspected sprayers can reduce the environmental contamination, improving the biological efficiency and guarantee the chemical application in a proper way and also the intended use.

Future activities will be concentrated on harmonising national sprayer inspections with the European norm EN 13790. The necessary legal conditions already exist in Germany so that inspections carried out in the EU Member States and candidate countries in accordance with EN 13790 are also acceptable in Germany.

#### References

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