



# Suggestion for an European approach for risk assessment for Pesticide Application Equipment in use to be exempted from inspection according to article 8 (3) of Sustainable Use Directive

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# Initial Situation

§8 (3) of Sustainable Use Directive (Directive 2009/128/EC)

Member States may apply different timetables and inspection intervals to pesticide application equipment (PAE) ...

- not used for spraying pesticides,
- which are handheld application equipment,
- knapsack sprayers,
- or additional PAE that represents a very low scale of use.

These exemptions have to be established based on a risk assessment.

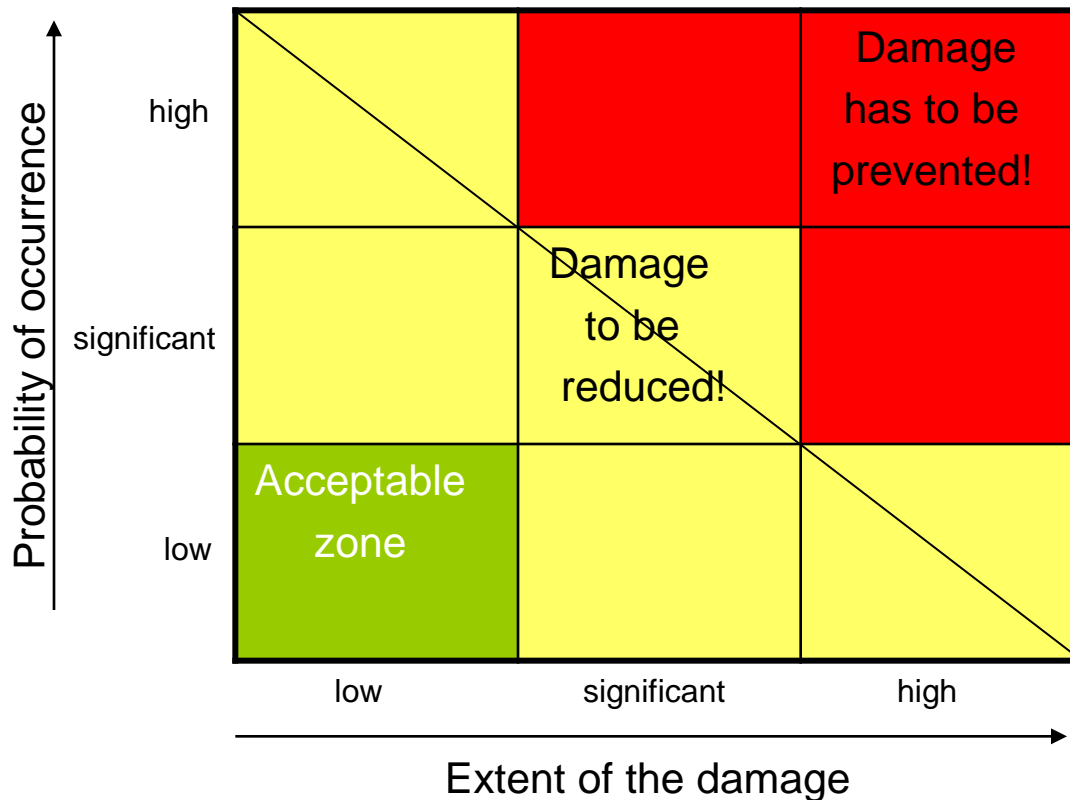
## **Hypothesis:**

A common risk assessment procedure being applicable in every single Member State has to be kept as simple as possible concerning data being necessary to implement, because the availability and quality of data being distributable in Member States varies strongly.

An approach on basis of Zürich-methodology was already presented on SPISE 4 (by Ganzelmeier) and SPISE 5 (by Wegener). In the meantime this approach was discussed and improved several times within SPISE TWG 2. The last outcome will be presented.

# Zürich-methodology: How it works

A technical risk is the product of probability of occurrence and the extend of the subsequent damage.



2-dimensional matrix

- Probability of occurrence
- Extent of the damage

Aim is to define how high a risk might be

- Green: no risk reduction is necessary
- Yellow: risk reduction is necessary
- Red: risk reduction is urgently necessary

# Calculating the extend of the damage on basis of sprayer inspection parameters



## 1. Step:

Qualitative analyses of equipment components being part of inspection (acc. EN 13790) and their impact on human health and environment combined with the classification scheme of relevant PAE.

Pesticide Appl. Equipment (PAE) Equipment components	spraying (incl. fogging)	hand-operated	not used for spraying	handheld	knapsack sprayers	additional/ low scale use	additional/ train	additional/ aircraft
Power transmission parts	++	+	0	--	--	0	+	+
Pump	+	+	+	0	0	0	+	+
Agitation	+	+	0	--	-	-	++	++
Spray liquid tank	++	+	+	--	--	+	++	++
Pipes and hoses	+	++	++	--	--	0	++	++
Spray boom	+	0	0	--	--	-	+	++
Filter	0	0	0	-	-	0	0	0
Nozzles	++	++	+	-	-	0	++	++
Controls	0	0	0	-	0	0	+	+
Regulation systems	+	0	0	-	-	+	++	++
Distribution / drift	+	0	0	-	0	0	++	++
Cleaning	++	0	0	-	-	0	++	++
Blowers	+	-	-	-	-	-	-	-
	205	165	150	45	60	125	215	230
	⑥	⑤	④	①	②	③	⑦	⑧

## 2. Step:

Quantification of the results using the following numbers:

very low	low	∅	high	very high
--	-	0	+	++
0	5	10	15	20

## 3. Step:

Ranking the extend of damage (1-8)

Extent of the damage →

Pesticide Appl. Equipment (PAE) Probability of occurrence - level -	① handheld	② knapsack sprayers	③ additional	④ not used for spraying	⑤ hand-operated	⑥ spraying (incl. fogging)	⑦ additional/ train	⑧ additional/ aircraft

# Extent of Damage – Results of an European survey\* (Wehmann 2015)



## Pesticide Application Equipment (PAE)

Equipment components	Handheld sprayers	Knapsack sprayers	Not used for spraying	Additional/ low scale use	Hand operated	Additional / aircraft	Additional/ train	Spraying incl. fogging
Power transmission parts	0	3	12	13	9	12	9	16
Pump	8	8	11	11	13	13	11	15
Agitation	4	4	4	10	14	13	11	16
Spray liquid tank	9	8	8	12	13	14	11	18
Pipes and hoses	9	9	11	12	18	14	13	16
Spray boom	2	9	11	12	12	13	12	14
Filter	6	8	5	11	11	13	11	13
Nozzles	12	9	9	13	16	16	13	16
Controls	9	9	9	9	13	13	11	13
Regulation systems	7	8	10	11	12	15	12	14
Distribution/ drift	9	12	9	12	13	17	16	18
Cleaning	9	9	8	11	13	14	13	18
Blowers	2	6	7	7	4	1	2	13
<b>Sum</b>	<b>87</b>	<b>105</b>	<b>114</b>	<b>143</b>	<b>161</b>	<b>170</b>	<b>184</b>	<b>199</b>
<b>Priority by sum</b>	<b>1<sup>th</sup></b>	<b>2<sup>nd</sup></b>	<b>3<sup>rd</sup></b>	<b>4<sup>th</sup></b>	<b>5<sup>th</sup></b>	<b>6<sup>th</sup></b>	<b>7<sup>th</sup></b>	<b>8<sup>th</sup></b>

\*Belgium, Czech Republic, Germany, Italy, Luxemburg, Spain, Norway, Sweden and The Netherlands

# Extent of Damage – Results of an European survey



Ranking by survey			Original ranking by Ganzelmeier	
1	87	Hand held sprayers	1	45
2	105	Knapsack sprayers	2	60
3	114	Not used for spraying	4	150
4	143	Low scale use	3	125
5	161	Hand operated	5	165
6	184	Aircrafts	8	230
7	189	Trains	7	215
8	199	Spraying incl. Fogging	6	205

Only slightly changes between the qualitative evaluation of Ganzelmeier compared to the average results of the nine other experts\*.

\*from Belgium, Czech Republic, Germany, Italy, Luxemburg, Spain, Norway, Sweden and The Netherlands

# Calculating the probability of occurrence

Problem:

No specific figures about the probability of occurrence are available on a national level.

Suggestion of Ganzelmeier:

Considering the amount of different PAE used in practice since this is proportional to the frequency of incidents.

=> Second European survey: Number of PAE in professional use per category:

- Handheld
- Knapsack
- Hand operated
- Spraying (incl. fogging)
- Not used for spraying
- Additional / low scale use
- Additional / aircraft
- Additional / train

# Calculating the probability of occurrence – results of an european survey\*\* (Wehmann 2015)



Member State	PAE per million hectare							
	Handheld	Knapsack-sprayer	Not used for spraying	Additional/low scale use	Hand operated	Additional/aircraft	Additional/train	spraying (incl. fogging)
<b>Belgium</b>	22.091	14.728	74	147	2.946	*	1	16.281
<b>Czech Republic</b>	57.405	57.405	287	57	57	9	11	3.444
<b>Germany</b>	13.170	23.946	808	299	1.916	0	2	10.297
<b>Italy</b>	1.128	2.722	544	389	3.889	1	2	50.560
<b>Luxemburg</b>	534	22.901	382	1.527	1.527	*	*	10.053
<b>The Netherlands</b>	2.671	53.419	1.068	2.671	2.137	1	3	10.417
<b>Norway</b>	50.454	10.091	10.091	5.045	3.027	1	3	20.182
<b>Spain</b>	*	*	*	*	2.105	*	*	12.041
<b>Sweden</b>	2.935	24.462	326	294	326	1	1	5.219
<b>United Kingdom</b>	*	2.741	*	*	*	0	1	2.295
<b>Average</b>	<b>15.039</b>	<b>21.242</b>	<b>1.358</b>	<b>1.043</b>	<b>1.793</b>	<b>1</b>	<b>2</b>	<b>14.709</b>

\*Not reported

\*\*Belgium, Czech Republic, Germany, Italy, Luxemburg, Spain, Norway, Sweden, The Netherlands and United Kingdom

In order to make the reported figures comparable between the Member States they were expressed as PAE per million hectares of arable land.



# Developing the risk matrix

Extent of the possible damage 

Pesticide Appl. Equipment (PAE)		Extent of the possible damage							
		① handheld	② knapsack sprayers	③ not used for spraying	④ additional/ low scale use	⑤ hand operated	⑥ additional/ aircraft	⑦ additional/ train	⑧ spraying (incl. fogging)
Probability of occurrence - level -		①	②	③	④	⑤	⑥	⑦	⑧
1	(5')	87	105	114	143	161	184	189	199
2	(10')	174	210	228	286	322	368	378	398
3	(15')	261	315	342	429	483	552	567	597
4	(20')	348	420	456	572	644	736	756	796
5	(25')	435	525	570	715	805	920	945	995

Exemptions from inspection possible
  Different time tables + intervals
  Inspection mandatory

( ) Numbers of PAE in thousands per million hectare

# Developing the risk matrix

Extent of the possible damage 

Pesticide Appl. Equipment (PAE)		Extent of the possible damage							
		① hand	② knapsprayers	③ notulorspraying	④ additional low speed	⑤ hand rated	⑥ additional airtr	⑦ additional train	⑧ sprayer (incl. rugging)
Probability of occurrence - level -		<b>Ranking of categories from first European survey</b>							
1	(5')	87	105	114	143	161	184	189	199
2	(10')	174	210	228	286	322	368	378	398
3	(15')	261	315	342	429	483	552	567	597
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# Developing the risk matrix

Extent of the possible damage 

Pesticide Appl. Equipment (PAE)	Extent of the possible damage							
	① handheld	② knapsack sprayers	③ not used for spraying	④ additional/ low scale use	⑤ hand operated	⑥ additional/ aircraft	⑦ additional/ train	⑧ spraying (incl. fogging)
Probability of occurrence - level -	①	②	③	④	⑤	⑥	⑦	⑧
1 (5')	87	105	114	143	161	184	189	199
2 (10')	174	210	228	286	322	368	378	398
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**Different levels with an linear increment of 5,000 PAE**

Exemptions from inspection possible
  Different time tables + intervals
  Inspection mandatory

( ) Numbers of PAE in thousands per million hectare

# Developing the risk matrix

Extent of the possible damage 

Pesticide Appl. Equipment (PAE)	Probability of occurrence - level -	Average numbers from first European survey							
		① ha	② kn	③ nc	④ ac lo	⑤ ha	⑥ ad air	⑦ ad tra	⑧ spraying (incl. fogging)
1	(5')	87	105	114	143	161	184	189	199
2	(10')	174	210	228	286	322	368	378	398
3	(15')	261	315	342	429	483	552	567	597
4	(20')	348	420	456	572	644	736	756	796
5	(25')	435	525	570	715	805	920	945	995

Exemptions from inspection possible
  Different time tables + intervals
  Inspection mandatory

( ) Numbers of PAE in thousands per million hectare

# Developing the risk matrix

Extent of the possible damage 

Pesticide Appl. Equipment (PAE)		Extent of the possible damage							
		① hand	② knapsprayers	③ no. of spraying	④ additional use	⑤ hand operated	⑥ aerial	⑦ aerial tractor	⑧ spraying (in)
Probability of occurrence - level -		① hand	② knapsprayers	③ no. of spraying	④ additional use	⑤ hand operated	⑥ aerial	⑦ aerial tractor	⑧ spraying (in)
1	(5')	87	105	114	143	161	184	189	199
2	(10')	174	210	228	286	322	368	378	398
3	(15')	261	315	342	429	483	552	567	597
4	(20')	348	420	456	572	644	736	756	796
5	(25')	435	525	570	715	805	920	945	995

**First line always multiplied by different number of levels**

Exemptions from inspection possible
  Different time tables + intervals
  Inspection mandatory

( ) Numbers of PAE in thousands per million hectare

# Developing the risk matrix

Extent of the possible damage  $\longrightarrow$

Pesticide Appl									
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To have an equal treatment of all PAE categories considered, the highest acceptable risk is the baseline for the risk tolerance which has to be applied (Wegener 2015).

Probability of occurrence - level -	① handhe	② knapsa	③ not use	④ addition low sca	⑤ hand of	⑥ additior aircraft	⑦ additior train	⑧ sprayin (incl. fo

Since the categories “handheld” and “knapsack sprayers” can be exempted from inspection, if the operators are trained, their numbers are basis for the definition of the risk tolerance being acceptable (Wegener 2015).

3	(15')	261	315	342	429	483	552	567	597
4	(20')	348	420	456	572	644	736	756	796
5	(25')	435	525	570	715	805	920	945	995

Exemptions from inspection possible
  Different time tables + intervals
  Inspection mandatory

( ) Numbers of PAE in thousands per million hectare


# Developing the risk matrix

Extent of the possible damage 

Pesticide Appl. Equipment (PAE)		Extent of the possible damage							
		① handheld	② knapsack sprayers	③ not for spraying	④ additional use	⑤ hand operated	⑥ additional air	⑦ additional tractor	⑧ spraying (inc. fogging)
Probability of occurrence - level -		<b>Figures from second European survey</b>							
1	(5')	37	105	114	143	161	184	189	199
2	(10')	174	210	228	286	322	368	378	398
3	(15')	261	315	342	429	483	552	567	595
4	(20')	348	420	456	572	644	736	756	796
5	(25')	435	525	570	715	805	920	945	995

Exemptions from inspection possible
  Different time tables + intervals
  Inspection mandatory

( ) Numbers of PAE in thousands

 Number of PAE per million hectare (qualitative)

# Developing the risk matrix

Extent of the possible damage  $\longrightarrow$

Pesticide Appl. Equipment (PAE)		Extent of the possible damage $\longrightarrow$							
		① handheld	② knapsack sprayers	③ not used for spraying	④ additional/ low scale use	⑤ hand-operated	⑥ additional/ aircraft	⑦ additional/ train	⑧ spraying (incl. fogging)
Probability of occurrence - level -									
1	(5')	87	105	114	143	161	184	189	199
2	(10')	174	210	228	286	322	368	378	398
3	(15')	261	315	342	429	483	552	567	597
4	(20')	348	420	456	572	644	736	756	796
5	(25')	435	525	<b>Highest acceptable risk = Baseline</b>					

Risk tolerance = 525

Exemptions from inspection possible
  Different time tables + intervals
  Inspection mandatory

( ) Numbers of PAE in thousands

Number of PAE per million hectare (qualitative)



# Results based on average figures of the surveys



Extent of the possible damage

Pesticide Appl. Equipment (PAE)		Extent of the possible damage							
		① handheld	② knapsack sprayers	③ not used for spraying	④ additional/ low scale use	⑤ hand-operated	⑥ additional/ aircraft	⑦ additional/ train	⑧ spraying (incl. fogging)
Probability of occurrence - level -		①	②	③	④	⑤	⑥	⑦	⑧
1	(5')	87	105	114	143	161	184	189	199
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3	(15')	261	315	342	429	483	552	567	595
4	(20')	348	420	456	572	644	736	756	796
5	(25')	435	525	570	715	805	920	945	995

Risk tolerance = 525

Exemptions from inspection possible
  Different time tables + intervals
  Inspection mandatory

( ) Numbers of PAE in thousands

Number of PAE per million hectare (qualitative)

# Results based on average figures of the surveys



Extent of the possible damage  $\longrightarrow$

1<sup>st</sup> option: European risk tolerance line derivated from mean values as shown. Member States just integrate their national figures and . Preferred by SPISE experts.

Probability of occurrence - level -	(1) handhel	(2) knapsac	(3) not used	(4) addition low scal	(5) hand-op	(6) addition aircraft	(7) addition train	(8) spraying (incl. fog)
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2<sup>nd</sup> option: Each Member State derivates its own risk tolerance line only based on national figures.

2	(10')	174	210	228	286	322	368	378	398
3	(15')	261	315	342	429	483	552	567	595
4	(20')	348	420	456	572	644	736	756	796
5	(25')	435	525	570	715	805	920	945	995

Risk tolerance = 525

■ Exemptions from inspection possible    
 ■ Different time tables + intervals    
 ■ Inspection mandatory

( ) Numbers of PAE in thousands    
 ■ Number of PAE per million hectare (qualitative)

# Next step

- There is still a need for more (from more Member States) and improved statistical data concerning the number of PAE within the different categories.
- SPISE Advice for Risk Assessment will be published soon.

**Thank you for  
your attention!**



**JKI**

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Federal Research Centre for Cultivated Plants

