Evaluation of spray strategies to control potato late blight with respect to efficacy, economics and environmental burden

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Objectives ParapluPlan

- Reduce the environmental impact of fungicides to control late blight by 75% in 2012 by 3 strategies:
  - Integrate all present and new research in the Netherlands and to focus all projects on this 2012 aim
  - Hand over the steering of all research to a board of representatives from the potato sector to ensure commitment to and application of the results of all short term and long term research
  - To combine the 3 parties research (WUR), policy (LNV) and potato sector in this Plan to ensure that each party takes its responsibility for reaching the 2012 aim

Phytophthora toolbox

- Applied Research aims:
  - integrate relevant results from other themes
  - evaluate results for different farming systems
  - validate with ‘on-farm research’
- Aim for practice:
  - make integrated knowledge ready for translation to farmers
- Ministry of Agriculture, Nature and Food quality

Strategies to control PLB 2008

- 5 locations
- Two cultivars
  - Intermediately resistant
  - Susceptible
- Spray reduced dose rates
- Spray according to a DSS
- Monitor
  - PLB epidemic
  - Yield
  - Costs
  - Environmental side effects

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UITGELICHT

- Nieuwe versie Optiras
- Phytophthora infestans in aardappel - een overzicht
- Spuitdoppen - over drift en doppenkeuze
- Kritieke perioden en haarden Phytophthora
- Aaltjeswaardplantschema 2006

RECENTE TIPS

20-10-08	Laat groenbemester niet groen de winter in gaan
16-10-08	Grond en baggerspecie
02-10-08	Afvoeren witlofgrond
01-10-08	Inventariseer plekken met wortelonkruiden
24-09-08	Kalibemesting in het najaar

Meer tips

RECENTE ITEMS

Locations and cultivars

Location	Susceptible	Intermediately resistant	Aim
Lelystad	Bintje (3, 4.5)	Agria (5.5, 7.5)	Ware
Westmaas	Lady Olympia (3,5)	Agria (5.5, 7.5)	Ware
Valthermond	Starga (5.5, 4.5)	Seresta (7, 8)	Starch
Vredepeel	Premiere (2.5, 5)	Hansa (4, 4)	Ware
Slootdorp	Spunta (5, 4.5)	Agria (5.5, 7.5)	Seed

Spray strategies

Strategy	Cultivar	Canopy growth	Onset tubers	Tuber filling
A	Susceptible	Shirlan (full dose)		
B	Intermediately resistant	Shirlan (reduced dose rate cv and crop phase dependent)		
C	Intermediately resistant	Curzate	Unikat Pro / Sereno	Ranman
D	Intermediately resistant	Revus	Infinito + Signum / Amistar	Ranman

Monitoring environmental side effects

- Use of fungicides is monitored by LEI using a registration system ARTIS (bookkeeping)
- Each active ingredient has a rating= “pollution points” for environmental side effects regarding:
  - Leaching into groundwater
  - Water organisms
  - Soil organisms
- “Pollution points” are calculated using official registration data
- The reduction target is **not** measured in number of sprays or kg’s but in these “pollution points”

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Milieumeetlat

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Intro

What can you do with the environmental indicator

The environmental indicator provides an overview of the burden on the environment of all allowed remedies in the Netherlands and makes it possible to compare remedies. This way you can choose the least damaging combative measure.

The environmental indicator for field crops shows for each allowed pesticide (1 kg/ha or 1 l/ha product) the following data:

- percentage active matter
- environmental impact points for water life (surface water)
- environmental impact points for terrestrial life
- environmental impact points for infiltration to ground water
- risks for useful organisms (biological controllers and pollinators)
- risks for the health of the applier

The environmental indicator for the indoor crops shows for each allowed pesticide (1 kg/ha or 1 l/ha product) the following data:

- percentage active matter
- environmental impact points for surface water trough space treatments
- environmental impact points for surface water trough other application techniques

On this website you can consult the environmental indicator and accompanying information. Furthermore an overview of all products and subscriptions is given.

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Input			Output (environmental effects)						
Ground	3 - 6 % organic matter		Active matter (kg/ha)	EIP water life	EIP ground life	EIP ground water	Risk biological controllers	Risk pollinators	Ris appl
Season	Spring (March - August)								
Pesticide	Dose (kg/ha of l/ha)	Drift (%)							
MERLIN	0.00	1.00							
None	0.00	1.00							
None	0.00	1.00							
None	0.00	1.00							
None	0.00	1.00							
Calculate									

Legenda

Milieubelastings-punten (MBP): 0-10 MBP 0-100 MBP | 10-100 MBP 100-1000 MBP | >100 MBP >1000 MBP → voor waterleven → voor bodemleven en grondwater

Nuttige organismen: A Bruikbaar in geintegr. teelt | B Beperkt bruikbaar | C Niet bruikbaar | ? Risico niet bekend

Risico voor de toepasser: I Irriterend | S Schadelijk | G Giftig | ZG Zeer giftig | B Bijtend

Done Internet

Environmental effect chart potato 2008

Aardappelen_ziekten.pdf - Adobe Reader

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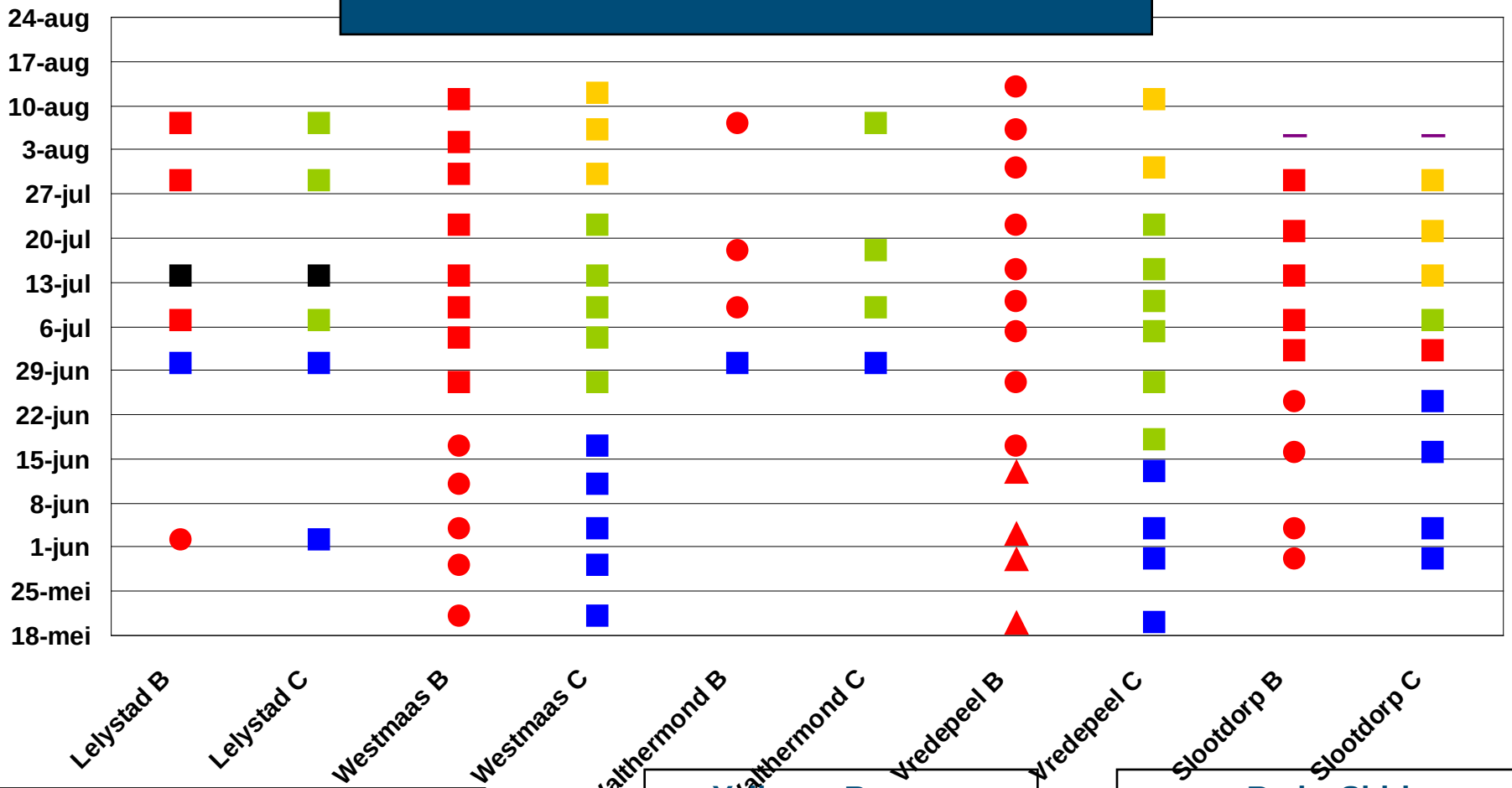
Middel	Toe-passings-tijdstip	Advies-dosering	Kg actieve stof	Milieu-effecten					Nuttige organismen	
				Grondwater organische stofklassen			Water-leven	Lucht		
				1,5-3%	3-6%	6-12%			Bestuivers	Bestrijders
		kg/ha of l/ha	kg a.s./ha	MBP	MBP	MBP	MBP	kg a.s./ha		
Phytophthora										
Acrobat	mrt-aug	2	1,49	138	44	44	2	0,15	A	B
Acrobat	sept-feb	2	1,49	560	44	44	2	0,08	A	B
Aviso	mrt-aug	3	1,85	171	57	57	3	0,20	A	B
Aviso	sept-feb	3	1,85	690	57	57	3	0,12	A	B
Curzate	mrt-aug	2,5	1,81	170	55	55	3	0,21	A	B
Curzate	sept-feb	2,5	1,81	700	55	55	3	0,12	A	B
Cymoxanil-M	mrt-aug	2,5	1,74	163	53	53	3	0,20	A	B
Cymoxanil-M	sept-feb	2,5	1,74	675	53	53	3	0,11	A	B
Daconil	mrt-aug	3	1,50	249	3	0	6	0,23	A	A
Daconil	sept-feb	3	1,50	297	3	0	6	0,14	A	A
Fubol gold	mrt-aug	2,5	1,70	400	53	53	3	0,22	?	?
Fubol gold	sept-feb	2,5	1,70	1100	53	53	3	0,12	?	?
Infinito	mrt-aug	1,2	0,70	37	1	0	1	0,40	?	?
Infinito	sept-feb	1,2	0,70	46	4	0	1	0,23	?	?
mancozeb 75 %	mrt-aug	2	1,50	150	50	50	2	0,17	A	B
mancozeb 75 %	sept-feb	2	1,50	620	50	50	2	0,09	A	B
Ranman	mrt-aug	0,2	0,08	0	0	0	13	0,01	A	C
Ranman	sept-feb	0,2	0,08	0	0	0	13	0,00	A	C
Revus	mrt-aug	0,6	0,15	0	0	0	1	0,01	?	?
Revus	sept-feb	0,6	0,15	0	0	0	1	0,00	?	?
Sereno, *90% driftreductie* [1]	mrt-aug	1,25	0,75	213	36	21	1	0,07	?	?
Sereno, *90% driftreductie* [1]	sept-feb	1,25	0,75	850	48	21	1	0,04	?	?
Sereno, *90% driftreductie* [1]	mrt-aug	1,5	0,90	255	44	26	1	0,09	?	?
Sereno, *90% driftreductie* [1]	sept-feb	1,5	0,90	1020	57	26	1	0,05	?	?
Shirlan	jan-dec	0,2	0,10	0	0	0	7	0,01	A	A
Shirlan	mrt-aug	0,4	0,20	0	0	0	14	0,02	A	A
Shirlan	sept-feb	0,4	0,20	0	0	0	14	0,01	A	A
Tanos, *90% driftreductie* [1]	mrt-aug	0,6	0,30	0	0	0	4	0,04	?	?
Tanos, *90% driftreductie* [1]	sept-feb	0,6	0,30	0	0	0	4	0,02	?	?
Tattoo-C	mrt-aug	1,75	1,31	109	2	0	4	0,51	A	A
Tattoo-C	sept-feb	1,75	1,31	130	2	0	4	0,30	A	A
Tattoo-C	mrt-aug	2,7	2,03	167	3	0	5	0,79	A	A
Tattoo-C	sept-feb	2,7	2,03	200	3	0	5	0,47	A	A
Unikat Pro, *90% driftreductie* [1]	mrt-aug	1,5	1,16	104	35	35	59	0,13	?	?
Unikat Pro, *90% driftreductie* [1]	sept-feb	1,5	1,16	420	35	35	59	0,07	?	?
Unikat Pro, *90% driftreductie* [1]	mrt-aug	1,8	1,39	124	41	41	70	0,15	?	?
Unikat Pro, *90% driftreductie* [1]	sept-feb	1,8	1,39	504	41	41	70	0,08	?	?
Valbon	mrt-aug	2	1,43	140	46	46	2	0,15	?	?
Valbon	sept-feb	2	1,43	580	46	46	2	0,08	?	?
Vondac DG (maneb 75%)	mrt-aug	2	1,50	150	50	50	2	0,17	A	B
Vondac DG (maneb 75%)	sept-feb	2	1,50	620	50	50	2	0,09	A	B

Spray applications 2008

Late blight barometer until August 14th

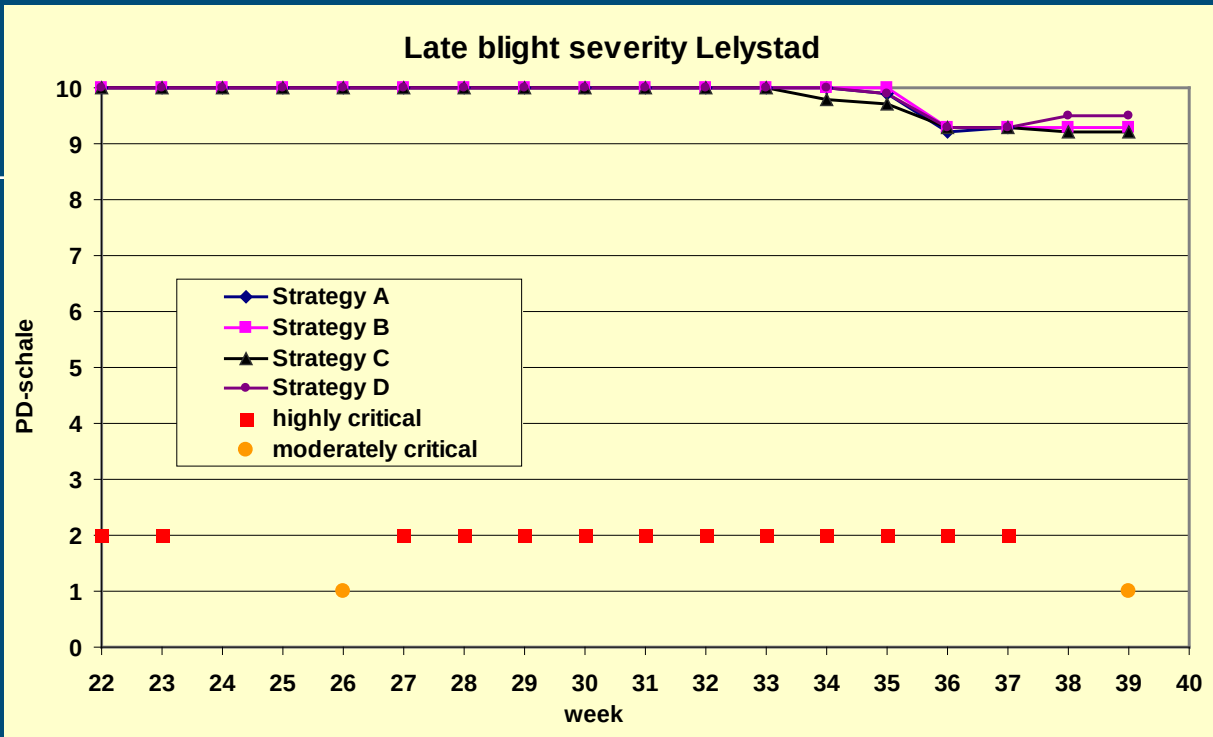


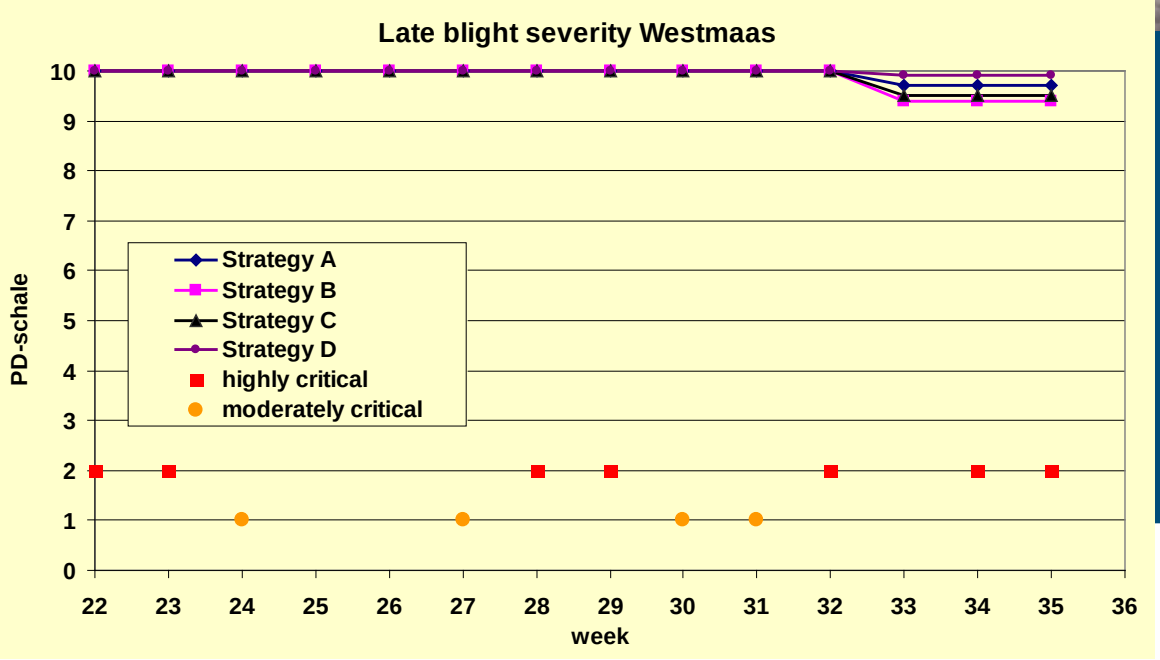
Vierkantje = Volle dosering
Rondje = 3/4 dosering
Driehoekje = 1/2 dosering
Streepje = doodgespoten

Yellow = Ranman
Black = Infinito
Purple = Reglone

Red = Shirlan
Bleu = Curzate M
Green = Sereno of Unikat

PLB epidemic





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Economics

- Yield
  - Quantity and quality
- Fungicide costs
  - # applications * prize | fungicide
- Labour

Results 2007

strategie	gewas-opbrengst ton/ha	Bruto geldopbrengst €/ ha	Kosten €/ ha	Opbrengst minus spuitkosten €/ ha	Uren nodig voor Phytophthorta beheersing	BRI-lucht A.s. kg/ha	MBP-grondwater	BRI-bodem kgdagen/ha	Actieve stof kg/ha	Actieve stof Aantal	MBP-waterleven % > 10 MBP	MBP-waterleven % > 100 MBP	MBP-bodemleven % > 100 MBP
streefwaarde						0.42	500	200			0	0	0
Lelystad A	59	5311	790	4521	5.4	1.76	100.17	537	5.1	18	89%	0%	0%
Lelystad B	56.2	5054	768	4268	5.4	1.71	100.17	507	4.9	18	89%	0%	0%
Lelystad C	41	3687	528	3159	4.5	1.21	100.17	267	3.3	15	67%	0%	0%
Lelystad D	60.2	5414	822	4592	5.4	1.93	744.23	393	10.6	21	57%	0%	0%
Lelystad E	53.9	4851	786	4065	5.4	2.49	1432.73	191	17.3	18	67%	0%	0%
Westmaas A	54.8	4934	765	4168	4.8	1.61	167.16	580	5.2	17	94%	0%	0%
Westmaas B	56.4	5078	705	4373	4.8	1.01	0.00	455	3.0	16	100%	0%	0%
Westmaas C	43.4	3908	426	3482	3.9	0.37	0.00	162	1.1	13	62%	0%	0%
Westmaas D	59.6	5365	764	4601	4.8	1.34	838.27	317	10.4	19	58%	0%	0%
Westmaas E	59.9	5390	728	4662	4.8	2.09	1742.74	65	19.4	16	69%	0%	0%
Rusthoeve A	54.5	4903	670	4233	4.2	1.27	100.08	454	3.7	15	93%	0%	0%
Rusthoeve B	35.2	4784	688	4096	4.5	1.29	100.08	446	3.7	16	94%	0%	0%
Rusthoeve C	50.3	4531	501	4030	4.2	0.78	100.08	215	2.2	15	60%	0%	0%
Rusthoeve D	55.5	4993	751	4241	4.5	1.64	12043.31	313	11.8	19	53%	0%	0%
Rusthoeve E	55.6	5000	742	4257	4.5	1.77	20946.11	100	15.8	17	65%	0%	0%
Valthermond A	38.2	2289	809	1481	5.1	1.77	0.00	530	5.0	19	89%	0%	0%
Valthermond B	28.5	1710	727	983	5.1	1.52	0.00	414	4.3	19	89%	0%	0%
Valthermond C	9	537	331	206	2.4	0.91	0.00	159	2.6	10	30%	0%	0%
Valthermond D	31	1859	869	990	5.1	2.11	269.30	396	12.8	22	55%	0%	0%
Valthermond E	31.7	1900	810	1089	5.1	2.77	546.64	167	20.7	19	63%	0%	0%
Vredepeel A	67.4	6066	749	5317	4.8	1.60	2.03	557	5.0	16	94%	0%	0%
Vredepeel B	76.3	6867	732	6134	4.8	1.57	2.03	534	4.9	16	94%	0%	0%
Vredepeel C	65.7	5916	651	5265	4.8	1.31	2.03	418	4.1	16	94%	0%	0%
Vredepeel D	75.8	6820	780	6040	4.8	1.83	204.75	430	10.7	19	58%	0%	0%
Vredepeel E	75.5	6791	781	6010	4.8	1.95	546.01	139	16.0	16	69%	0%	0%

Conclusions

- Timing of the spray application is of the utmost importance
- Economic benefit is predominantly determined by cultivar and less by fungicides used.
- Strategies do not exceed impact points for water life at a high level
- Strategies comply with impact points for terrestrial life and ground water

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