Interreg
Baltic Sea Region
Baltic Slurry Acidification

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FLAGSHIP

Initial experiences in using SATs in the BSR

Edited by Jānis Kažotnieks,
Latvian Rural Advisory and Training Centre

February 2019

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February 2019

Preface

This report is prepared in the frames of the Baltic Slurry Acidification project, co-financed by Interreg Baltic and implemented by 16 partners from Baltic Sea Region (BSR) countries in the period from March 2016 to February 2019.

The report is a deliverable of work package 3 (WP3) and presents the process and experiences with the initial implementation of the SATs for each of the six pilot installations, as well as results of analysed registrations, such as actual consumption of sulphuric acid, treated slurry, labour, and other observations. The results are intended to be an encouragement for the sustainable way of using resources at the same time reducing ammonia emissions from livestock farms.

The report is compiled by the WP3 leader on basis of information and data provided by the 6 pilot installation hosts. The registration part of the report has been elaborated by assisting leader of WP3 Henning Lyngsø FOGED from Organe Institute ApS.

Ozolnieki, Latvia

February 2019

Jānis KAŽOTNIEKS

Contents

Summary

All the investment partners have used their possibility to take part in project because it was very innovative and they were planning to optimise their use of fertilisers at the same time reducing N emmisions and smell during spreading. Most of them met their expectations during the project, probably because half of them were familiar with acidification process before the project. Half of the investment partners have had no issues working with SATs as well as had no major issues dealing with equipment suppliers, but they also expected higher yields at the same time being worried about a negative impact of acidification on soil's pH and machinery. Most of the partners were happy to see the acidification had no negative influence on machinery nor the soil's pH. They have also mentioned the importance of proper training and full attention dealing with acid. The importance of proper calibration of machinery was also highlighted at the same time surprisingly low influence on soil's microbiological activity was spotted too. As a result, two thirds of investment partners will continue to use SATs after the project is over, but two of them will not do so.

12 purchases were made of in total 67,295 litres of sulphuric acid for a total price of € 25,412.90. The average price was thus € 0.38 per litre or € 0.21 per kg, assuming the density is 1.84 kg/litre.

70 acidification processes happened, whereof 2 in-storage acidifications and 68 in-field acidifications.

A total of 36,187 tonnes of slurry was acidified, whereof 32% pig slurry, 47% cattle slurry, 18% digestate of livestock manure origin, and 3% digestate of energy crop origin.

77 cases of field spreading were registered, covering 1.330,35 ha, most of them were winter wheat (740 ha), grass (208 ha) and maze (118 ha).

Extra labour of 55 man-hours and extra costs of € 298 were caused by the acidification process, equal to 0.09 minutes extra labour and € 0.008 per tonnes of slurry. Much of the extra labour was for replacing IBC tanks during in-field acidification.

Background

Investments in slurry acidification technology were made by six partners in six countries during the implementation of the project Baltic Slurry Acidification. Five of the investments were made in in-field acidification technology and one in in-storage acidification technology:

Country	Investor	Technology
SE	Br. Göransson AB	In-field
EE	Estonian Crop Research Institute	In-field
LV	Lauku Agro	In-field
LT	Animal Science Institute of Lithuanian University of Health Sciences	In-field
PL	Institute of Technology and Life Sciences	In-storage
DE	BLUNK GmbH	In-field

The purpose of the investments was to demonstrate slurry acidification in practice in the involved countries, and in the same time participate in the clarification of the feasibility of the technology under national conditions. It was planned to rent equipment in Finland, but the possibility for that disappeared and field trials were instead carried out with manually prepared acidified slurry there. No investments were planned in Denmark, where the use of SATs is well known. Most investments happened during 2017 and early 2018.

Method

Initial experiences

In order to collect the experience gained, the checklist was elaborated https://docs.google.com/forms/d/1Lj9DoBFERM2aU9lnDKL2HPQkfHlEoasI8w27SqzrQaw/edit . It contains 9 different questions with the possibility to choose the correct answer in each part of it. To make it possible for the investment partners to express their own versions of answers, each of 9 questions have its own chapter "OTHER", where each of respondents were able to tell their personal opinion if it differed from versions provided. The questionnaires were sent to each of investment partners to be filled in and submitted. All of the partners filled them in but not many of them utilised the posiibility to use chapter "OTHER". Wich then indicated two possible scenarious: the versions of answers provided were perfectly matching their experiences; or partners were not active to express their experiences.

After the collection of all the data, it was transferred into MS Excel for the evaluation. Charts were made for each of the 9 questions and analysed in reports part RESULTS.

Registration and calculations

In order to register the actual consumption of acid, treated slurry etc., an online tool was made available for the project partners that had invested in slurry acidification technologies. The satreg app is found at http://www.microfeeder.com/organe/satreg. The web application is responsive and can be used from both a computer and a mobile phone, and it was thus possible to do registrations while being in the process, thereby not needing to make preliminary paper registrations that later had to be computed and maybe handed over to another person in the meantime with the risk of data errors and loss in the meantime.

The satreg app has 4 parts: The three first parts are for registration of purchases, acidification processes and field spreading, respectively, while the fourth part is for viewing slightly analysed results and for printing of either own or all registered data. For the field spreading part, the investors were asked to map the fields where acidified slurry was spread.

All operations done with the project investment had to be included in the registration at the satreg app.

By end of the project, the registrations were analysed in the following way.

1. Data was copied from MSSQL tables to MS EXCEL.
2. Users that are not representing investor partners were identified (these users included those working with field trials, that in most cases also were registered in the satreg app).
3. Data for users that are not registered as investor partners were removed as the purpose alone is to analyse registrations done by investors.
4. Data for 0-registrations was removed.
5. Prices registered in SEK currencies were converted to € with an exchange rate of 10.5 SEK/€.
6. ITP had reported a price of € 0,22 for 7780 L acid, and it is assumed the price is per litre.
7. Acid amounts in kg were converted to litres by dividing with the density 1,84 kg/liter.

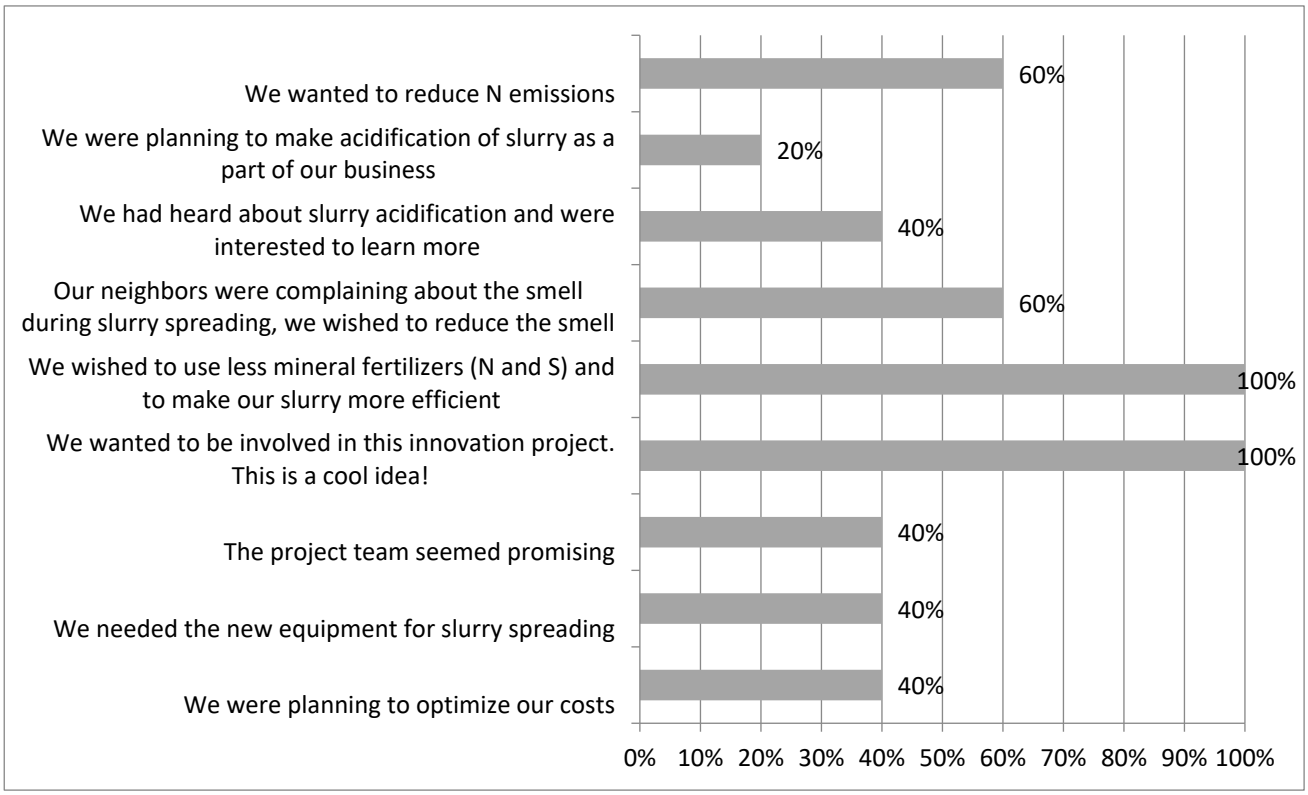
The resulting, detailed registrations are shown in Annex A.

Results

Initial experiences

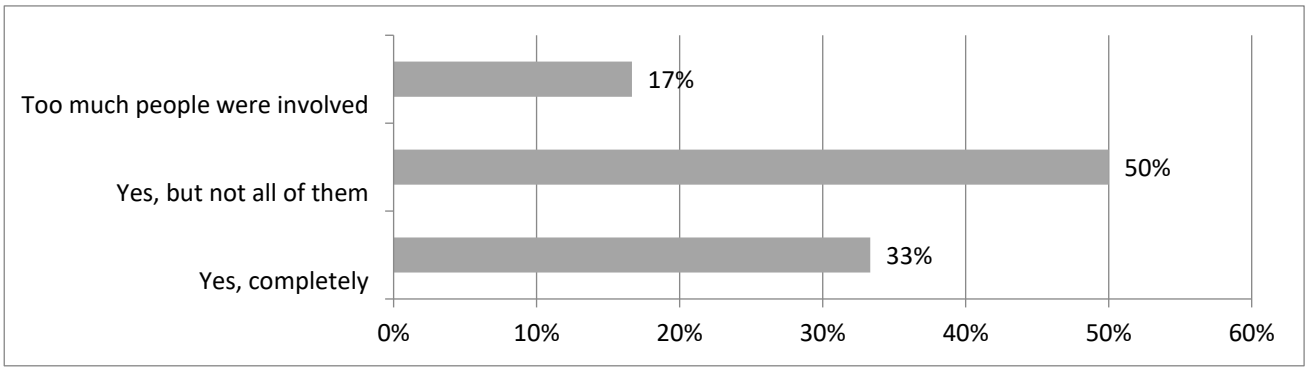
The detailed analysis of experience obtained on basis of the questionnaires submitted is shown as follows:

Question No 1. Why did you join the project, decide to make investment and what did you want to accomplish?



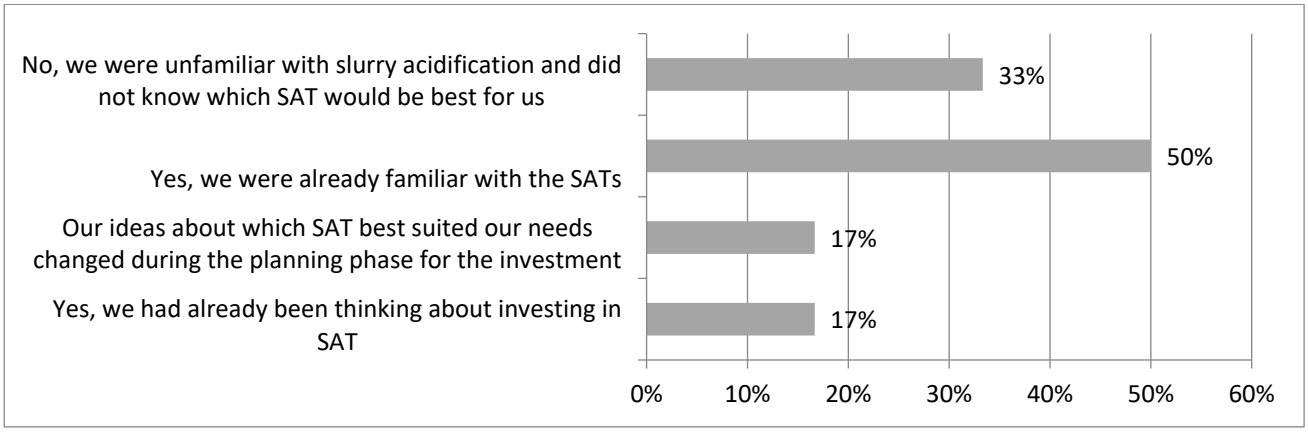
All the investment partners were happy to take part in the project because it was very interesting and innovative idea in combination with their expectations to optimise their use of fertilisers and reduction of NH_3 emissons and smell during spreading of manure. Two partners have heard about acidification process and wished to learn more at the same time also two have felt the project team very promising. The very important factors to optimise the costs and need for new manure spreading equipment were also mentioned by two partners. The partner which is farm contractor had decided to go for the project because he wished to make acidification of slurry/digestate as a part of his business. All the partners were happy being in project in their own way.

Question No 2. Has the project your met your expectations?



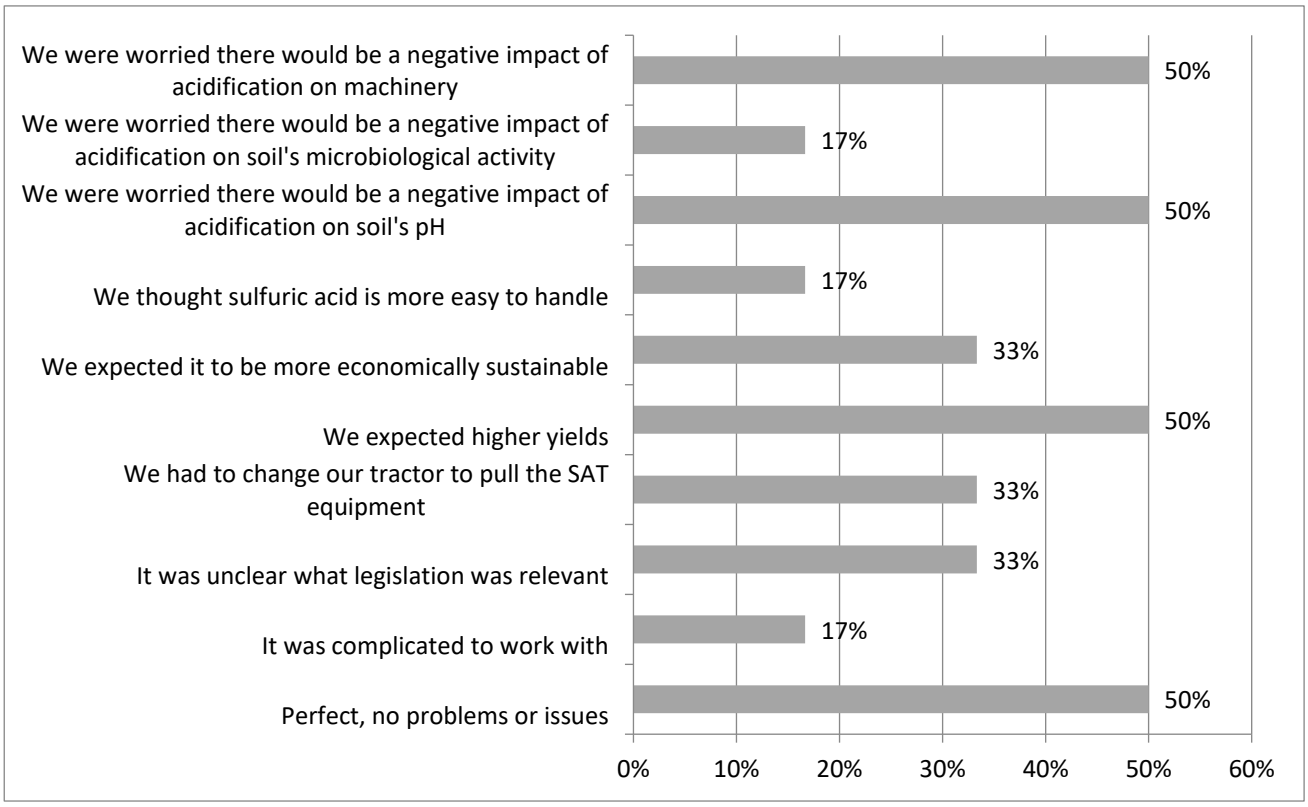
Mostly all of the partners agreed the project has met their expectations at least most of them, wich is great in terms the project has been successful in this way too. One of the respondents felt it was too many persons involved to make the project even more successful. This is one side of the story, but otherwise – the more people we have around, the greater is the reflection of activities we do.

Question No 3. Was the idea behind your SAT investment clear when you joined the partnership and wrote the application?



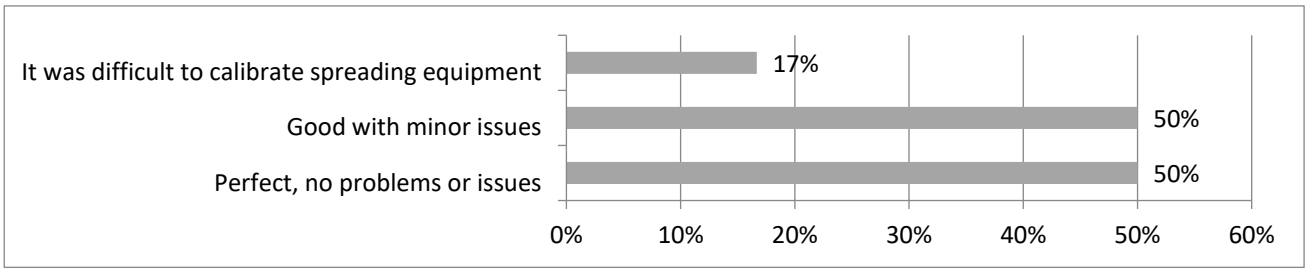
One of the reasons of the success of the project surely lies here, where four of six partners were familiar with acidification process before the project and were thinking about investing in SAT too. At the same time two partners were totally new in this field, but looking back at the level of satisfaction for the project results, those who were new at the beginning had become an experts at the end.

Question No 4. How would you summarize your work with realizing and using the SAT investment?



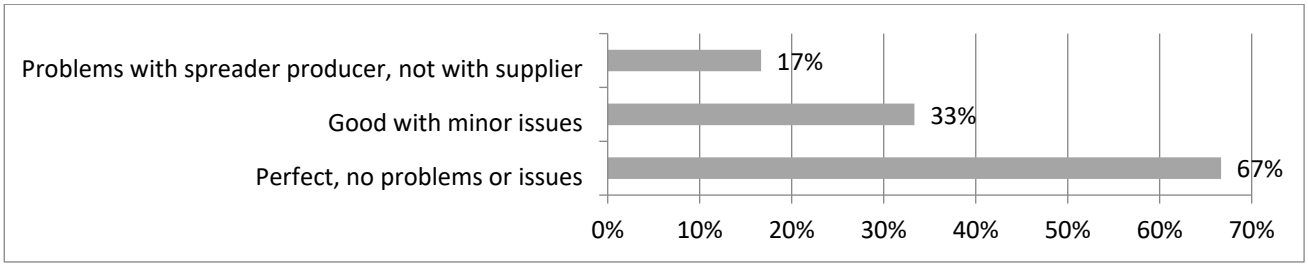
Most of the partners again proved they have had no majour difficulties using the SATs during the project, which in turn proves the great importance of proper evaluation process before the decision for the real choice. At the same time half of the partners were expecting higher yields according to the fact the great part of NH_3 (even up to 70% in some cases) have been captured during the acidification. Three partners were worried about a negative impact of acidification on machinery and soil's pH, but it turned out there is no that negative impact, which again is one good achievement of the project. One third of partners were in some difficulties about the local legislation concerning acid handling, which in turn shows some legislation bottlenecks in some countries. Two partners had to change their tractors to pull the equipment, because were not taking in account the recommendations their tractors should have at least 4,5 tons lifting capacity in their front linkages. It was surprise that only one partner was worried about the negative impact of acidification on soil's microbiological activity, but it turned out there is no negative impact in this field too.

Question No 5. How did the SAT equipment performed?



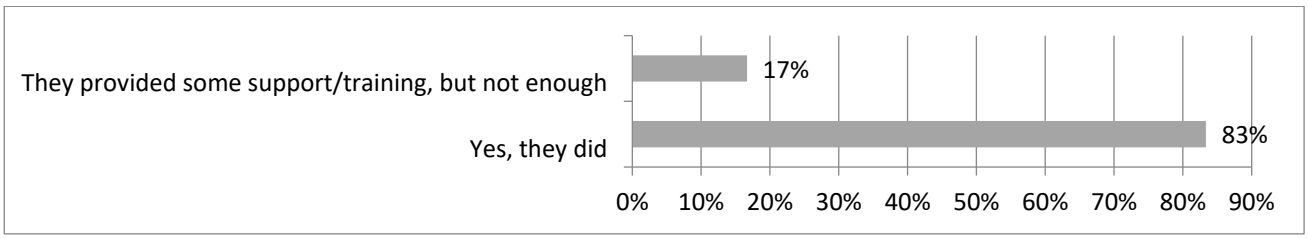
In terms of SAT equipment performance, none of partners have had any major difficulties – half were 100% satisfied, the other half has experienced some minor issues. One partner has had some majour difficulties with the performance of slurry spreader, as a result they have had some difficulties with field tests as well. The problem was sold and the equipment is in good technical state. Careful planning and market analysis in combination with good procurement documentation has again proved its importance.

Question No 6. How was the communication with the equipment supplier?



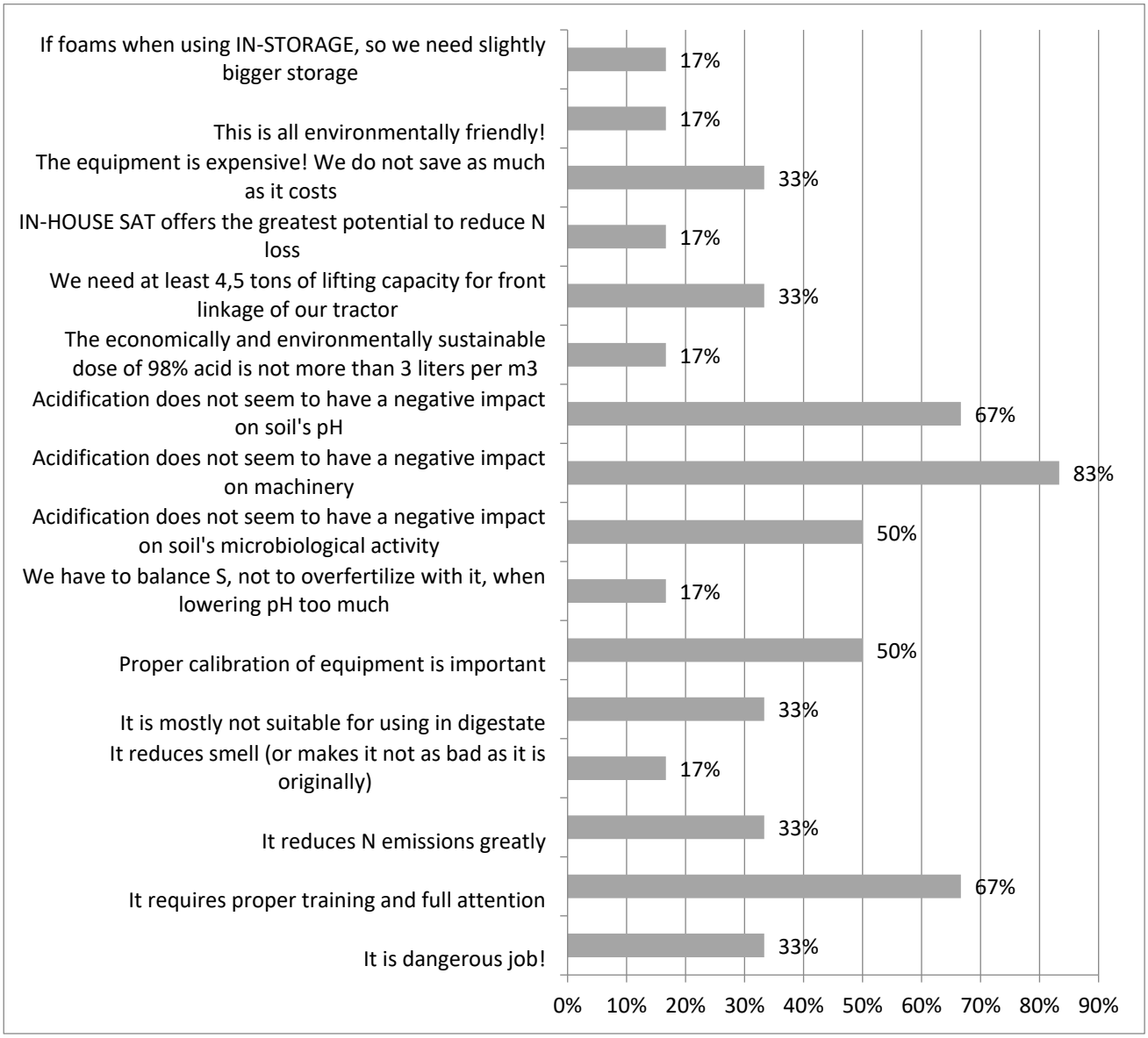
Four out of six partners have had not a single problem in communication with suppliers, which is very good achievement. They have proven themselves as good machinery dealers and supplied the highest quality equipment to be used during the project. As it is obvious there is one partner being not satisfied with the communication with the dealer of slurry spreader.

Question No 7. Did the supplier provided sufficient support and training to use the equipment?



As it was highlited before, the training of personnel is vitally important when dealing with acidification equipment. The project has been close to the top in this field too, because five out of six partners have received sufficient support and training to use SAT equipment, so they are trained well to do the job in safe way.

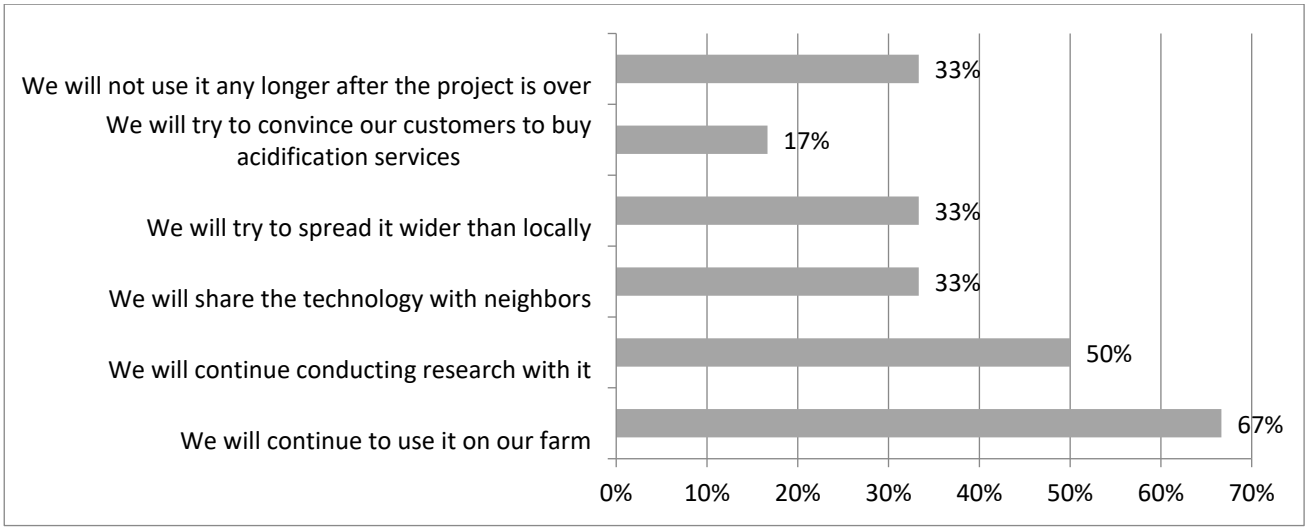
Question No 8. What are the main lessons you learned about slurry acidification?



This was the most important question in our questionnaire, because it all reflects the true experience gained by each of the partners. And which is the most surprisingly five out of six respondents said they have learned the acidification has no negative impact on machinery. At the same time everything comes in good order looking at the second spot in this chart, where four partners see the acidification has no negative impact on soil's pH, which is very important indeed. Also four partners highlight the importance proper training and full attention during acidification. And this again means the project team has worked good to put the correct accents on things which are vitally important to make this technology sustainable and safe. Half of partners see the calibration of equipment as a very important factor and the same amount have learned the acidification does not harm soils microbiological activity. The last is very good news for the project, because we were not sure if the acid will not kill all the living organisms in soil and manure. Some two more partners have realised the acidification is mostly not suitable for using in

digestate, because of high consumption of acid to lower the pH even to 6,4. We are hardly coming into era of reduction emmisions as we see just two out of six respondents said they have got the understanding that acidification reduces N emissions greatly. The good thing in project is that all the rest of our team have got the confidence- the acidification is a clean-tech and reduces emissions significantly. There are also two who have realised this equipment is too expensive and it is impossible to save as much as it costs. Possibly this is the reason two of the partners will not use this technology when project is over.

Question No 9. How will you use SAT investment after the project?



The picture is clear here – four out of six will continue to go for acidification, the rest two will quit. The reason of the last is mainly the price of equipment and secondly the lack of support for this technology, which in turn is probably because it is novice in most countries. The good trend is that three out of four will go on researching and will surely be able to present their results to make acidification of manure more recognisible. The project has also done a great job and we all are totally sure the acknowledgement of acidification has gretly rosen during these three years.

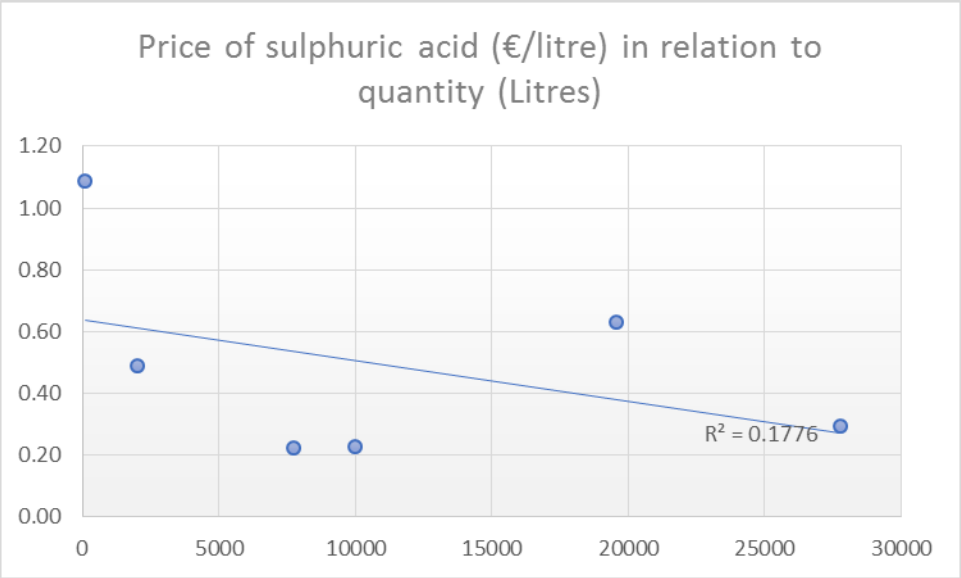
Purchases

12 purchases were made of in total 67,295 litres of sulphuric acid for a total price of € 25,412.90. The average price was thus € 0.38 per litre or € 0.21 per kg, assuming the density is 1.84 kg/litre.

For the individual countries, the registrations are as follows:

Country	Litres acid bough	€ paid	€/litre acid, realised	€/litre acid, expected
SE	19,565	12,252	0.63	0.25
LV	27,792	8,088	0.29	0.237
PL	7,780	1,712	0.22	0.22
DE	2,038	990	0.49	0.066
EE	120	130	1.08	0.75
LT	10,000	2,241	0.22	0.22

Sulphuric acid is a large commodity on the world market, and it is unexplainable why the prices differ so much as shown in the table, except for EE, who alone bough a small amount delivered in canisters.



53% of the purchased sulphuric acid had a concentration of 98%, 32% a concentration of 96% and the rest 15% a concentration of 94%.

Acidification

70 acidification processes happened, whereof 2 in-storage acidifications and 68 in-field acidifications.

A total of 36,187 tonnes of slurry was acidified, whereof 32% pig slurry, 47% cattle slurry, 18% digestate of livestock manure origin, and 3% digestate of energy crop origin.

It was reported that 81,295 litres of acid were used for the acidification, equal to 2.2 litres per tonnes. The consumption is thus about 14,000 litres higher than the reported purchase. It is not clear what the difference is caused by.

It was reported that extra labour of 55 man-hours and extra costs of € 298 were caused by the acidification process, equal to 0.09 minutes extra labour and € 0.008 per tonnes of slurry. Much of the extra labour was for replacing IBC tanks during in-field acidification.

Field spreading

77 cases of field spreading was registered, covering 1.330,35 ha. The crops were as shown in the following table:

Crop	Ha
Winter wheat	740.68
Winter rape	28.37
Rye	54.08
Spring wheat	91.38
Barley	40
Spring rape	10.06
Oats	40
Maize	117.64
Grass	208.14
Other	0
Total	1330.35

A map of the fields is seen here, although some field trials with small plots are also mapped:

The map is also found at http://www.microfeeder.com/organe/satregmap, where it is possible to zoom in at the fields.

Annex A – Detailed registrations of SAT investors

Annex A.1: Users

id	level	email	username	lastname	firstname
730	2	mathiastillback@gmail.com	mathiastillback@gmail.com	Br. Göransson	NULL
731	2	gints00@gmail.com	Gints (Lauku Agro)	Jakubovskis	Gints
734	2	jbarwicki@gmail.com	jbarwicki@gmail.com	NULL	NULL
739	2	j.ostermann@blunk-gmbh.de	j.ostermann@blunk-gmbh.de	NULL	NULL
749	2	kalvi.tamm@etki.ee	kalvi.tamm@etki.ee	Tamm	Kalvi
750	2	arturas.siukscius@lsmuni.lt	arturas.siukscius@lsmuni.lt	NULL	NULL

Annex A.2: Purchase of acid

id	date	unit	l amount	quality	price	currency	user
52	27-09-2017 00:00	L	4021,7391	98	606,80	€	731
55	13-06-2018 00:00	L	120	96	130,00	€	749
57	01-03-2018 00:00	L	10000	96	2000,00	€	718
1059	08-05-2018 00:00	L	11786,413	98	5364,45	€	731
1061	03-04-2018 00:00	L	2038,0435	96	990,00	€	739
1062	23-05-2018 00:00	L	11983,696	98	2116,80	€	731
1067	28-05-2018 00:00	L	5000	94	1120,00	€	750
1068	20-06-2018 00:00	L	7780	98	1711,60	€	734
1074	01-06-2017 00:00	L	6521,7391	96	4036,38	€	730
1075	07-05-2018 00:00	L	6521,7391	96	4107,81	€	730
1076	19-06-2018 00:00	L	6521,7391	96	4107,81	€	730
1077	15-06-2018 00:00	L	5000	94	1121,25	€	750

Annex A.3: Acidification process

id	date	type	slurryamount	slurrytype	acidamount	acidunit	acidquality	manhours	price	comment	currency	user
25	28-02-2018 00:00	4	8000	1	25000	L	94	4	30	Soe ilm	€	749
27	13-04-2018 00:00	4	420	2	950	L	98	NULL	NULL	NULL	€	731
1029	30-04-2018 00:00	4	540	3	1511	L	98	1	10	replacing IBC, calibrating pH sensor	€	731
1030	02-05-2018 00:00	4	267	3	766	L	98	1	10	replacing IBC	€	731
1032	21-04-2018 00:00	4	40	1	4	L	96	1,5	1,1		€	739
1033	09-05-2018 00:00	4	830	2	832	L	98	1	10	replacing IBC	€	731

id	date	type	slurryamount	slurrytype	acidamount	acidunit	acidquality	manhours	price	comment	currency	user
1034	10-05-2018 00:00	4	177	2	260	L	98	0	0		€	731
1035	12-05-2018 00:00	4	171	2	231	L	98	1	1	replacing IBC	€	731
1036	14-05-2018 00:00	4	262	2	351	L	98	0	0		€	731
1037	15-05-2018 00:00	4	1335	2	2219	L	98	2	20	replacing IBC	€	731
1038	16-05-2018 00:00	4	1202	2	1526	L	98	1	10	replacing IBC	€	731
1039	17-05-2018 00:00	4	685	2	1119	L	98	1	10	replacing IBC	€	731
1040	18-05-2018 00:00	4	430	2	773	L	98	0	0		€	731

id	date	type	slurryamount	slurrytype	acidamount	acidunit	acidquality	manhours	price	comment	currency	user
1041	21-05-2018 00:00	4	830	2	1417	L	98	1	10	replacing IBC	€	731
1042	22-05-2018 00:00	4	563	2	1097	L	98	1	10	replacing IBC	€	731
1043	23-05-2018 00:00	4	428	2	750	L	98	1	10	replacing IBC	€	731
1044	24-05-2018 00:00	4	852	2	1510	L	98	2	20	replacing IBC	€	731
1045	25-05-2018 00:00	4	270	2	485	L	98	0	0		€	731
1046	28-05-2018 00:00	4	757	2	825	L	98	1	10	replacing IBC	€	731
1047	29-05-2018 00:00	4	671	2	1074	L	98	1	10	replacing IBC	€	731

id	date	type	slurryamount	slurrytype	acidamount	acidunit	acidquality	manhours	price	comment	currency	user
1048	30-05-2018 00:00	4	890	2	1301	L	98	1	10	replacing IBC	€	731
1050	29-05-2018 00:00	4	400	1	640	L	94	1	3	NULL	€	750
1051	11-06-2018 00:00	4	510	3	395	L	98	0	0		€	731
1052	14-06-2018 00:00	4	660	2	890	L	98	1	1	replacing IBC	€	731
1053	15-06-2018 00:00	4	747	2	2229	L	98	2	20	replacing IBC	€	731
1054	18-06-2018 00:00	4	450	2	1512	L	98	1	10	replacing IBC	€	731
1056	07-07-2017 00:00	4	68	2	123	L	96	1	0	Demo 1 Uppland	€	730

id	date	type	slurryamount	slurrytype	acidamount	acidunit	acidquality	manhours	price	comment	currency	user
1057	01-07-2018 00:00	2	40	1	280	L	98	2	8	NULL	€	734
1058	02-07-2018 00:00	2	1000	1	7000	L	98	6	24	NULL	€	734
1059	05-07-2018 00:00	4	500	2	1000	L	98	1,5	1,1		€	739
1060	21-06-2018 00:00	4	1000	4	3000	L	98	1,5	1,1		€	739
1067	07-07-2017 00:00	4	28	2	44	L	96	0	0	Demo 2 Uppland	€	730
1068	08-07-2017 00:00	4	56	1	64	L	96	0	0	Demo 3 Uppland	€	730
1069	12-07-2017 00:00	4	56	1	89	L	96	0	0	Demo Västra Götaland, unsure slurry type	€	730

id	date	type	slurryamount	slurrytype	acidamount	acidunit	acidquality	manhours	price	comment	currency	user
1070	02-08-2017 00:00	4	28	3	43	L	96	0	0	unsure slurry type, estimated treated amount, 56.105285 13.084955	€	730
1071	16-08-2017 00:00	4	56	1	58	L	96	0	0	unsure slurry type, estimated treated amount, 55.992133 12.922762	€	730
1072	24-08-2017 00:00	4	458	3	624	L	96	0	0	Svegrup	€	730
1073	30-08-2017 00:00	4	29,6	2	10	L	96	0	0	unsure slurry type, 56.167222 13.016535	€	730
1074	06-09-2017 00:00	4	289,3	3	746	L	96	0	0	M Wahlberg, 56.183908 13.065808	€	730
1075	20-04-2018 00:00	4	676	3	909	L	96	0	0	Br Göransson, Pbc	€	730
1076	21-04-	4	162	3	172	L	96	0	0	Br Göransson,	€	730

id	date	type	slurryamount	slurrytype	acidamount	acidunit	acidquality	manhours	price	comment	currency	user
	2018 00:00									Ingelsg. Im		
1077	21-04-2018 00:00	4	384	3	554	L	96	0	0	Br Göransson, Tommarp 86c	€	730
1078	22-04-2018 00:00	4	596	3	778	L	96	0	0	Br Göransson, Tommarp 86c	€	730
1079	23-04-2018 00:00	4	28	2	35	L	96	0	0	Estimated amount treated, 55.973072 12.872790	€	730
1080	02-05-2018 00:00	4	127	2	154	L	96	0	0	56.153302 12.744678	€	730
1081	06-05-2018 00:00	4	199	3	685	L	96	0	0	Br Göransson, Nordstr	€	730
1082	07-05-2018 00:00	4	463	3	1486	L	96	0	0	56.199017 13.046555	€	730

id	date	type	slurryamount	slurrytype	acidamount	acidunit	acidquality	manhours	price	comment	currency	user
1083	08-05-2018 00:00	4	14	1	19	L	96	0	0	Demo Halland, 56.419777 13.131722	€	730
1084	08-05-2018 00:00	4	562	2	282	L	96	0	0	Mårten Olsson, 56.283562 12.875015	€	730
1085	09-05-2018 00:00	4	84	2	121	L	96	0	0	Demo, estimated amount treated, 56.277277 12.908978	€	730
1086	14-05-2018 00:00	4	56	3	121	L	96	0	0	Br Göransson, estimated amount treated, 56.125678 13.004118	€	730
1087	14-05-2018 00:00	4	21	3	22	L	96	0	0	Svegrup, 55.930473 12.888570	€	730
1088	21-05-2018 00:00	4	257	3	708	L	96	0	0	Svegrup, 55.930928 12.886885	€	730
1089	22-05-2018	4	102	3	308	L	98	0	0	Svegrup, 55.935192 12.887738	€	730

id	date	type	slurryamount	slurrytype	acidamount	acidunit	acidquality	manhours	price	comment	currency	user
	00:00											
1090	07-06-2018 00:00	4	736	3	1687	L	96	0	0	M Wahlberg (motorvägen), 56.188698 13.037875	€	730
1091	18-06-2018 00:00	4	270	3	707	L	96	0	0	M Wahlberg, 56.186502 13.049492	€	730
1092	18-06-2018 00:00	4	201	3	530	L	96	0	0	M Wahlberg, 56.181423 13.055148	€	730
1093	25-06-2018 00:00	4	330	3	781	L	96	0	0	M Wahlberg, 56.181633 13.072677	€	730
1094	30-05-2018 00:00	4	840	2	1512	L	94	2	6	NULL	€	750
1095	01-06-2018 00:00	4	720	1	1152	L	94	2	6		€	750
1096	05-06-2018	4	372	1	595,2	L	94	2	6	NULL	€	750

id	date	type	slurryamount	slurrytype	acidamount	acidunit	acidquality	manhours	price	comment	currency	user
	00:00											
1097	14-06-2018 00:00	4	223,63	1	357,81	L	94	1	3	NULL	€	750
1098	15-06-2018 00:00	4	205	1	328	L	94	1	3	NULL	€	750
1099	18-06-2018 00:00	4	420	2	756	L	94	1	3	NULL	€	750
1100	20-06-2018 00:00	4	422,94	2	761,29	L	94	1	3		€	750
1101	25-06-2018 00:00	4	377,37	2	679,27	L	94	1	3		€	750
1102	29-06-2018 00:00	4	481,53	2	866,75	L	94	1	3		€	750
1103	31-05-2018	4	348	1	556,8	L	94	2	6		€	750

id	date	type	slurryamount	slurrytype	acidamount	acidunit	acidquality	manhours	price	comment	currency	user
	00:00											
1104	28-05-2018 00:00	4	251,5	2	452,7	L	94	1	3		€	750
1105	28-05-2018 00:00	4	261	2	469,8	L	94	1	3		€	750

Annex A.4: Spreading

id	date	treatedarea	crop	comments	user
43	28-02-2018 00:00	200	1	Tõusme faas	749
1051	14-05-2018 00:00	4,46	1	mixed with spring barley	731
1052	14-05-2018 00:00	12,5	1	mixed with spring barley	731
1055	15-05-2018 00:00	84	1	mixed with spring barley	731
1058	21-04-2018 00:00	1	1	trial	739
1060	17-05-2018 00:00	35	1	mixed with spring barley	731
1061	21-05-2018 00:00	1,95	1	mixed with spring barley	731
1062	21-05-2018 00:00	11,22	1	mixed with spring barley	731
1063	22-05-2018 00:00	14,94	1	mixed with spring barley	731
1064	21-05-2018 00:00	12	1	mixed with spring barley	731
1065	23-05-2018 00:00	20,22	1	mixed with spring barley	731
1066	24-05-2018 00:00	20,13	1	mixed with spring barley	731
1067	28-05-2018 00:00	17,88	1	mixed with spring barley	731
1068	25-05-2018 00:00	11,76	1	mixed with spring barley	731
1069	28-05-2018 00:00	0,8	1	mixed with spring barley	731
1070	29-05-2018 00:00	16,11	1	mixed with spring barley	731
1071	29-05-2018 00:00	10,14	1	mixed with spring barley	731
1072	29-05-2018 00:00	22,18	1	mixed with spring barley	731
1093	05-07-2018 00:00	22,67	1		739
1095	19-07-2018 00:00	0,02	1	NULL	1
1111	06-09-2017 00:00	12	1	unsure crop and treated area	730
1112	20-04-2018 00:00	27	1	unsure crop and treated area	730

id	date	treatedarea	crop	comments	user
1113	21-04-2018 00:00	6,5	1	unsure crop and treated area	730
1114	21-04-2018 00:00	15	1	unsure crop, treated area 384/25	730
1115	22-04-2018 00:00	24	1	unsure crop, treated area 596/25	730
1116	24-04-2018 00:00	1,1	1	unsure crop, treated area 28/25	730
1117	02-05-2018 00:00	5	1	unsure crop, treated area 127/25	730
1118	06-05-2018 00:00	8	1	unsure crop, treated area 199/25	730
1119	07-05-2018 00:00	18,5	1	unsure crop, treated area 463/25	730
1120	08-05-2018 00:00	0,6	1	unsure crop, treated area 14/25	730
1121	08-05-2018 00:00	23	1	unsure crop, treated area 562/25	730
1122	09-05-2018 00:00	2	1	unsure crop and treated area	730
1123	11-05-2018 00:00	2	1	unsure crop and treated area	730
1124	14-05-2018 00:00	1	1	unsure crop and treated area	730
1125	21-05-2018 00:00	10	1	unsure crop, treated area 257/25	730
1126	22-05-2018 00:00	4	1	unsure crop, treated area 102/25	730
1127	07-06-2018 00:00	30	1	unsure crop, treated area 736/25	730
1128	18-06-2018 00:00	11	1	unsure crop, treated area 270/25	730
1129	18-06-2018 00:00	8	1	unsure crop, treated area 201/25	730
1130	25-06-2018 00:00	13	1	unsure crop, treated area 330/25	730
1048	02-05-2018 00:00	18,13	2	NULL	731
1049	02-05-2018 00:00	3,8	2	NULL	731
1050	02-05-2018 00:00	6,44	2	NULL	731
40	13-04-2018 00:00	12,53	3	NULL	731
1053	11-05-2018 00:00	5,5	3	NULL	731
1054	10-05-2018 00:00	7,9	3	mixed with spring barley	731

id	date	treatedarea	crop	comments	user
1056	09-05-2018 00:00	28,15	3	NULL	731
1079	29-05-2018 00:00	22	4	field trial	750
1088	11-06-2018 00:00	24,02	4	NULL	731
1133	05-06-2018 00:00	21	4	field trial	750
1140	31-05-2018 00:00	13,92	4	NULL	750
1143	28-05-2018 00:00	10,44	4	R.Terebeizos ūkis	750
1132	01-06-2018 00:00	40	5	field trial	750
1142	28-05-2018 00:00	10,06	6	R.Terebeizos ūkis	750
1131	30-05-2018 00:00	40	7	field trial	750
1086	18-06-2018 00:00	33,66	8	NULL	731
1087	18-06-2018 00:00	7,2	8	NULL	731
1094	21-06-2018 00:00	18,96	8		739
1096	21-06-2018 00:00	21,52	8		739
1134	14-06-2018 00:00	20,3	8	field trial	750
1135	15-06-2018 00:00	16	8	field trial	750
42	27-02-2018 00:00	70	9	Teine niide	749
1059	21-04-2018 00:00	1	9	trial	739
1091	01-07-2018 00:00	1	9	NULL	734
1092	02-07-2018 00:00	25	9	NULL	734
1103	07-07-2017 00:00	1,6	9	Demo 1 Uppland	730
1104	07-07-2017 00:00	1,5	9	Demo 2 Uppland	730
1105	08-07-2017 00:00	3	9	Demo 3 Uppland	730
1106	12-07-2017 00:00	4	9	Demo Västra Götaland	730
1107	02-08-2017 00:00	0,5	9	unsure crop and treated area	730

id	date	treatedarea	crop	comments	user
1108	16-08-2017 00:00	1	9	unsure crop and treated area	730
1109	24-08-2017 00:00	18	9	unsure crop and treated area	730
1110	30-08-2017 00:00	0,5	9	unsure crop and treated area	730
1136	18-06-2018 00:00	20	9	field trial	750
1137	20-06-2018 00:00	20,14	9	field trial	750
1138	25-06-2018 00:00	17,97	9	NULL	750
1139	29-06-2018 00:00	22,93	9	NULL	750

Interreg Baltic Sea Region

Baltic Slurry Acidification

EUROPEAN REGIONAL DEVELOPMENT FUND

EUROPEAN UNION

www.balticslurry.eu

Summary of the project

'Baltic Slurry Acidification' is an agro-environmental project, co-financed by Interreg Baltic Sea Region under the priority area 'Natural resources' and the specific objective 'Clear waters'. The aim of the project is to reduce nitrogen losses from livestock production by promoting the use of slurry acidification techniques in the Baltic Sea Region and thus to mitigate eutrophication of the waters, including airborne eutrophication.

Summary of the report

This report describes the initial experiences of using SATs as well as results of analysed registrations in Estonia, Latvia, Lithuania, Poland, Germany and Sweden.

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