



Knowledge grows

# Yara Liquid Fertilizers

Profit from Accuracy

# Precision and Profit from Yara Liquid Fertilizers

## Fast and Accurate

Many of the country's leading farmers continue to move to liquid fertilizer systems. As practical, innovative businessmen they recognise the substantial economic benefits to be gained by applying fertilizer quickly and accurately. With 36 metre booms now allowing crops to be treated accurately at rates of 1 hectare every 60 seconds, the rewards are obvious.

## No Wastage

From both environmental and financial aspects, liquid fertilizer's ability to be applied precisely up to the field margin without wastage or contamination of hedgerows and waterways is of increasing importance to maintain good farming practice. The problems and costs associated with the disposal of fertilizer bags are also eliminated.

## Simple

Moving to a liquid fertilizer system is both easy and inexpensive. Your farm sprayer can be converted within minutes – just as long as it takes to change a set of jets. Yara will supply storage tanks appropriate for your farm's requirements and these can be installed quickly and easily. In fact, you could be applying Yara's liquid fertilizer within days of making the decision to 'go liquid'.





# The Key to Profitability

## Unbeatable Accuracy

Liquid fertilizer applied through your current farm sprayer can give you an immediate improvement in the accuracy of your nitrogen and NPKS applications helping to ensure the best possible yield.

Accuracy is improved:

- Across the full boom width, however wide.
- Over the entire field, with the correct amount applied per hectare.
- At the end of bouts by reducing overlaps.
- At the field margins, by farming to maximum efficiency to the crop's edge - and no further.

Liquid fertilizer applications can produce an improvement in spreading accuracy worth £15 per ha for winter wheat when compared to solid fertilizer. If the solid fertilizer is of poor quality or spreading conditions are not ideal at wide bout widths, the financial loss can easily reach £40 per hectare.

Yara's liquid fertilizers are 100% water soluble, and hence are uniform, which means they give consistent flow rates and no recalibration is required when changing grades. Electronic rate control systems can enhance accuracy even further, and when combined with variable rate technology and individual boom section control, the accuracy is unsurpassed.

These benefits can lead to:

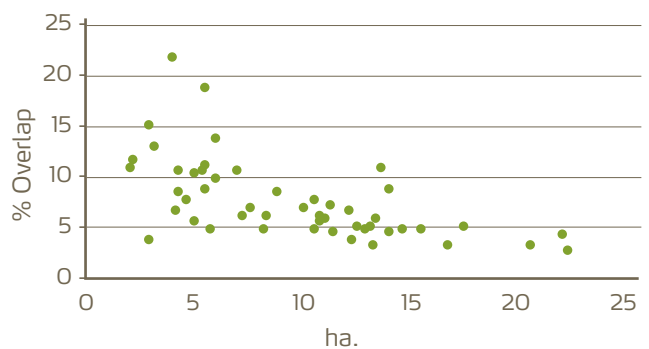
- Even crops
- Reduced overlapping on headlands
- Less fertilizer wastage
- Less risk of lodging and diseases
- Easier combining
- More consistent grain samples
- Higher yields

## Boom Section Control

Adopting sprayer boom section control means the problem of fertilizer over-application caused by overlapping doses can be almost eliminated, resulting in more even crops and reduced lodging. This can also result in substantial fertilizer savings. The more irregular the field shape and the smaller the size, the bigger the benefit.

The following chart shows how the percentage of overlap can vary with shape and size. Fifty random fields were measured and the overlap calculated at an average of 8%.

% Overlap v Field Size ha.



Where field sizes are small or irregular, the bigger the benefit.



## The Headland Effect

Liquid fertilizer applied through stream jets fertilizes to the edge of the crop and no further.

- Under-fertilizing crop margins has been calculated to give up to 34% yield loss in the last 3 metres of crops, averaging over the whole headland as much as 5%.
- Over-fertilizing i.e applying past the crop edge into hedgerows or on to roads, wastes up to 5% of total fertilizer applied to the field.
- Spraying up to the crop edge also protects the environment and field margins under management schemes.



## Headland Area Yield Loss

This table demonstrates the losses that can be avoided from suboptimal yields on headlands.

Headland area		
Total arable	ha	600
No. of fields	no.	40
Tramline width	m	24
Average field size	ha	15.00
Headland area per field	ha	3.49
Headland area over farm	ha	139.51
Headland area	%	23%

Headland yield loss		
Target yield	t/ha	9
Headland yield loss	%	5%
Yield loss per field	t	1.67



## More Working Days

Liquid fertilizers can mean more available spreading days because, compared to solid fertilizers, applications are less affected by weather conditions.

- Applications can be made on damp days and even rainy days.
- Spread patterns are less affected by the wind.

Switching to liquids and increasing work rates produces real benefits:

- Timely drilling / spraying.
- Reduction in machinery / fuel / labour costs.
- Quick, effective treatment of the crop at the correct growth stage.
- Efficient utilization of inputs.

For example, several years ago the move from 12 to 24 metre bout widths reduced the time taken to cover 1 hectare by over 40%. On a 1000 hectare farm, the time spent applying fertilizer and agrochemicals was reduced by some 160 hours through adoption of 24 metre tramlines.

Wider bout widths also effectively increase the area cropped. The wheelings caused by spreading fertilizer at 12 metres, even on standard width tyres, cover a minimum of 5% of the cropped area. The move to 24 metres reduced this area to 2.5%, resulting in an increase in yield. On the same 1000 hectare farm, this translated to an additional wheat value of over 200 tonnes production.

Needless to say, the financial benefits are greater for farms adopting 36, 40 and 48 metre systems. Liquid fertilizers can also be tank mixed with some agrochemicals, further reducing spraying time and increasing efficiency.



This chart demonstrates the increase in efficiency obtained by upgrading fertilizer application systems. It starts with a 'present system' of a 2 tonne capacity solid fertilizer spreader with a boom width of 18 metres and works through various upgrade options. The fourth

option is a modern 4000 litre capacity sprayer with a 36 metre boom width. These are routine examples only, Yara's liquid fertilizer sales staff are able to calculate your own 'tailor made' system comparison.

## Typical Systems Comparison

Detail		Present system	Proposed systems		
		1	2	3	4
Total crop	ha	1000.00	1000.00	1000.00	1000.00
Tank capacity	lt/kg	2000.00	2500.00	3000.00	4000.00
Application rate	lt kg/ha	200.00	200.00	200.00	200.00
Fill time	min	5.00	6.00	7.00	10.00
Application speed	kph	12.00	12.00	15.00	15.00
Boom width	m	18.00	24.00	24.00	36.00
Travel time	min	10.00	10.00	10.00	10.00
<b>Hectares / Hour</b>		<b>9.65</b>	<b>12.36</b>	<b>14.92</b>	<b>20.09</b>
<b>Total Hours</b>		<b>103.00</b>	<b>80.00</b>	<b>67.00</b>	<b>49.00</b>





## Increased Efficiency

The following factors mean that more acres are covered each working day:

- Modern liquid fertilizer systems are capable of achieving extremely high work rates.
- The use of maximum boom widths, now typically 36 metres and rising, means fewer passes.
- Sophisticated boom systems allow for increased ground speed.
- Rapid fertilizer handling and tank filling means less standing time

## Reduced Labour

The handling and application of liquid fertilizer is often a simple, one man operation - at the delivery stage, no farm labour is required as the tanker driver will off-load directly into the farm storage tank. The transfer of fertilizer from storage tank to sprayer is very rapid (typically at the rate of 450 litres/minute). A quicker and much more efficient operation than lifting and splitting bags.

These factors, when combined with increased work rates, can release labour for other farm operations during the busiest times of the farming calendar. The system is very flexible and can be easily optimised according to the farm's topography, labour profile and working practices.



## Better Use of Capital

Changing to liquid fertilizers can have a considerable effect on the capital requirements of a farming enterprise:

- One machine often replaces two.
- Most farm sprayers can be converted at relatively little cost to apply liquid fertilizers, and a spreader is not required.
- Alternatively, where two sprayers are required, both fertilizing and spraying capacities are effectively doubled.

### Handling Equipment

Liquid fertilizers are delivered directly into farm storage tanks and simply pumped into the sprayer. On some farms this means that solid fertilizer handling equipment can be completely dispensed with.

### Storage

Buildings are no longer required for fertilizer storage and can therefore be released, thus increasing grain storage and marketing options, or providing covered storage for vehicles or non agricultural revenue earning purposes such as warehousing or storage.





## Easier Deliveries to Farm

- Purpose made tanks to Yara specification.
- Deliveries off-loaded by Yara driver.
- No farm labour required.
- No forklift needed.
- Exact quantities can be transferred, no partly-used bags.
- No more inconvenient delivery times.



## Reduced Storage

- Release farm buildings for other use - possible alternative income.
- No split bags - reduces waste.
- No bag disposal - direct cost saving.



## One Man Loading

- One man operation.
- Sprayer links directly to storage tank.
- No forklift or bag handler.
- No trailer.
- No second tractor.
- Fast fill pump transfers product, no physical handling.
- Sprayer can refill centrally, or at tanks spread across the farm, or fed by bowser.



# Meeting the Crop's Nutrient Requirements

Yara's liquid fertilizer production system is tremendously flexible enabling a wide range of analyses under the brand name Chafer™ to be produced.

Yara is therefore able to supply an extensive and unrivalled range of Nitrogen and NPK solutions; many with the inclusion of sulphur (see following page).

## Balanced Nitrogen Supply

Most of the straight nitrogen used on UK farms is supplied as ammonium nitrate, with some as urea. Each form of nitrogen behaves slightly differently in the soil and releases nitrogen to the crop at different rates. Nitrogen in its nitrate form is available for rapid uptake by the crop. In its ammonium and ureic forms, nitrogen is released more slowly, thereby extending the availability of nitrogen to the crop over a longer period.

Chafer Nuram, Yara's liquid nitrogen fertilizer, combines these two sources of nitrogen to produce a unique solution with 'balanced' release properties. Although primarily soil applied, the range also includes grades suitable for foliar applications and precision placement on salad and vegetable crops.

## Prescription Blending

Where required, grades can be produced to meet the specific nutrient requirements of individual crops. This is particularly relevant to many root crops and also to applications of N, P and K to standing crops in the spring. Similarly, where sulphur is a limiting factor to crop yield, numerous N:S ratio products are available to match the farm requirement.

## Trace Elements

A range of YaraVita trace elements are tank-mixable with some of our liquid fertilizers allowing for reduced passes through the crop.

For further details please contact your local Yara Area Manager or visit [www.tankmix.com](http://www.tankmix.com)



Yara's liquid fertilizer production - Elvington



Stream bars

# Yara Liquid Fertilizer Grades

The number of Chafer™ grades we can supply is limitless. The number available for delivery to you today extends to over 300 different analyses. The main N+S range and examples of our NPK+S grades are listed below.

## Main N+S Range

Fertilizer Grade	%N	%SO <sub>3</sub>
Chafer Nuram 37	37	0
Chafer Nuram 35+S	35	7
Chafer N32+9.4 SO <sub>3</sub>	32	9.4
Chafer N30.3+10.8 SO <sub>3</sub>	30.3	10.8
Chafer N29+11.9 SO <sub>3</sub>	29	11.9
Chafer N25+14.3 SO <sub>3</sub>	25	14.3
Chafer N19+19 SO <sub>3</sub>	19	19

## Foliar Applied N

Fertilizer Grade	%N	%SO <sub>3</sub>
Chafer Nufol 20	20	0
Chafer Nufol+S	20	4.2

## Examples of NPK+S Range

Fertilizer Grade	%N	%P <sub>2</sub> O <sub>5</sub>	%K <sub>2</sub> O	%SO <sub>3</sub>
Chafer 20-10-0+S	20	10	0	5
Chafer 20-0-10	20	0	10	
Chafer 19.8-0-9.4+S	19.8	0	9.4	5
Chafer 19-4-4	19	4	4	
Chafer 18-27-0	18	27	0	
Chafer 18-9-9	18	9	9	
Chafer 18-6-9	18	6	9	
Chafer 17.9-5.6-8.5+S	17.9	5.6	8.5	5
Chafer 17-0-11	17	0	11	
Chafer 16-16-0	16	16	0	
Chafer 16-3-10	16	3	10	
Chafer 14-10-10	14	10	10	
Chafer 12-18-0	12	18	0	
Chafer 12.2-0-11.3+S	12.2	0	11.3	5
Chafer 12-0-12	12	0	12	
Chafer 11-11-11	11	11	11	
Chafer 11-10.3-10.3+S	11	10.3	10.3	5
Chafer 10-15-10	10	15	10	
Chafer 10-5-12	10	5	12	
Chafer 9-18-9	9	18	9	
Chafer 9-9-12	9	9	12	
Chafer 8.5-7.5-11.3+S	8.5	7.5	11.3	5
Chafer 8-24-0	8	24	0	
Chafer 8-14-10	8	14	10	
Chafer 7-21-9	7	21	9	
Chafer 7-16-10	7	16	10	
Chafer 6-11-12	6	11	12	
Chafer 6-9-12	6	9	12	
Chafer 5-15-10	5	15	10	
Chafer 4.7-11.3-11.3+S	4.7	11.3	11.3	5
Chafer 4-12-12	4	12	12	
Chafer 4-4-12	4	4	12	
Chafer 2-7-14	2	7	14	



Yara's liquid fertilizer production - Chedburgh

## Main Nitrogen Range - Application Rate Guide

Application Rate	Chafer NURAM 37		Chafer NURAM 35+S		Chafer N32 + 9.4 SO <sub>3</sub>		Chafer N30.3 + 10.8 SO <sub>3</sub>		Chafer N29 + 11.9 SO <sub>3</sub>		Chafer N25 + 14.3 SO <sub>3</sub>		Chafer N19 + 19 SO <sub>3</sub>		Chafer NUFOL 20		Chafer NUFOL 20+S	
	Litres/ha	N	SO <sub>3</sub>	N	SO <sub>3</sub>	N	SO <sub>3</sub>	N	SO <sub>3</sub>	N	SO <sub>3</sub>	N	SO <sub>3</sub>	N	SO <sub>3</sub>	N	SO <sub>3</sub>	N
50	19	4	5	16	15	6	13	7	10	10	10	10	10	10	10	10	2	
75	27	5	7	24	23	9	20	8	22	9	11	19	14	14	15	15	3	
100	37	7	9	32	30	12	29	11	29	12	14	25	14	19	20	4		
125	46	9	12	40	38	14	36	14	36	15	18	31	18	24	24	5		
150	56	11	14	48	45	16	44	16	44	18	21	38	21	29	29	6		
175	65	12	16	56	53	19	51	19	51	21	24	44	25	33	33	7		
200	74	14	19	64	61	22	58	22	58	24	27	50	29	38	38	8		
225	83	16	21	72	68	24	65	24	65	27	30	56	32	43	43	9		
250	93	18	24	80	76	27	73	27	73	30	33	63	36	48	48	11		
275	102	19	26	88	83	30	80	30	80	33	36	69	39	52	52	12		
300	111	21	28	96	91	32	87	32	87	36	43	75	43	57	57	13		
325	120	23	31	104	98	35	94	35	94	39	46	81	46	62	62	14		
350	130	25	33	112	106	38	102	38	102	42	50	88	50	67	67	15		
375	139	26	35	120	114	41	109	41	109	45	54	94	54	71	71	16		
400	148	28	38	128	121	43	116	43	116	48	57	100	57	76	76	17		
425	157	30	40	136	129	46	123	46	123	51	61	106	61	81	81	18		
450	167	32	42	144	136	49	131	49	131	54	64	113	64	86	86	19		
475	176	33	45	152	144	51	138	51	138	57	68	119	68	90	90	20		
500	185	35	47	160	152	54	145	54	145	60	72	125	72	95	95	21		
525	194	37	49	168	159	57	152	57	152	62	75	131	75	100	100	22		
550	204	39	52	176	167	59	160	59	160	65	79	138	79	105	105	23		
575	213	40	54	184	174	62	167	62	167	68	82	144	82	109	109	24		
600	222	42	56	192	182	65	174	65	174	71	86	150	86	114	114	25		
625	231	44	59	200	189	68	181	68	181	74	89	156	89	119	119	26		
650	241	46	61	208	197	70	189	70	189	77	93	163	93	124	124	27		
675	250	47	63	216	205	73	196	73	196	80	97	169	97	128	128	28		
700	259	49	66	224	212	76	203	76	203	83	100	175	100	133	133	29		
725	268	51	68	232	220	78	210	78	210	86	104	181	104	138	138	30		
750	278	53	71	240	227	81	218	81	218	89	107	188	107	143	143	32		
775	287	54	73	248	235	84	225	84	225	92	111	194	111	147	147	33		
800	296	56	75	256	242	86	232	86	232	95	114	200	114	152	152	34		
825	305	58	78	264	250	89	239	89	239	98	118	206	118	157	157	35		
850	315	60	80	272	258	92	247	92	247	101	122	213	122	162	162	36		
875	324	61	82	280	265	95	254	95	254	104	125	219	125	166	166	37		
900	333	63	85	288	273	97	261	97	261	107	129	225	129	171	171	38		
925	342	65	87	296	280	100	268	100	268	110	132	231	132	176	176	39		
950	352	67	89	304	288	103	276	103	276	113	136	238	136	181	181	40		
975	361	68	92	312	295	105	283	105	283	116	139	244	139	185	185	41		
1000	370	70	94	320	303	108	290	108	290	119	143	250	143	190	190	42		



## Moving to Liquids

Making the change to Yara's liquid fertilizers couldn't be simpler. All that is involved is changing sprayer jets and the safe siting of storage tanks.

### Storage Tanks

Yara recommend GRP (Glass Reinforced Plastic) tanks which we have manufactured to our own strict specifications. These tanks have provided robust, rust-free storage for over 30 years and are available in a range of sizes.

Your local Yara Area Manager will be pleased to inspect any potential site and recommend the ideal number.

For specific tank size and foundation guidelines see Yara's tank leaflet or visit [www.yara.co.uk](http://www.yara.co.uk)

### Quick & Easy Conversion

Yara can advise on the choice of nozzles for your sprayer depending on its make and the crops to be fertilized. 'Quick-fit' stream bars, specifically designed for top-dressing applications on arable and grass crops are widely used. These bars produce a vertical stream of liquid which is unaffected by boom height. They are extremely accurate and enable applications of nitrogen to be carried out throughout the season. Examples of stream bars and alternative designs of liquid fertilizer nozzles available from a number of manufacturers, are shown below.



Lockable stainless steel valves



Security cover



# UK Facilities



- Liquid fertilizer production and storage facility
- Solid fertilizer facility
- Foliar and micronutrient production and analysis facility
- UK Head Office



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# Yara UK Limited

The Chafer™ product range of liquid fertilizers are manufactured and distributed by Yara UK limited, the UK division of the Norwegian based Yara International ASA.

Yara International's business is based on the processing of natural resources to meet the world's needs for food. In all its activities, Yara emphasises quality, the efficient use of resources and care for the environment.

Yara is the world's largest producer of agricultural fertilizers. Extensive investment in production and agronomic R&D programmes produce fertilizer products, systems and advice designed to ensure the future of good environmental and cost effective sustainable farming.





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