Issue
#1

Potash market highlights

2014

Research on potash application in Russia in 2014

Report from 21st International Agro-Industrial Exhibition

Key Element

Uralkali Market **Analysis Report**

March 2015

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URALKALI®

Dear friends,

2014 was a record for the potash industry. Potash demand expanded in all regions, particularly in India, China and South East Asia in response to lower prices, with global potash deliveries exceeding 2011 levels and reaching 62 million metric tonnes. Improved consumption and customers rebuilding stocks following the uncertainty of 2H 2013 were the key growth factors.

Positive market environment enabled Uralkali to produce and sell over 12 million tonnes of KCl.

At the same time we continued to work with customers using our crop nutrition expertise to raise awareness about responsible and effective potash application. To date these programmes have included agricultural producers in India, China, Vietnam, Bangladesh, Brazil and Russia.

In Russia, potash is mainly applied as part of compound fertilisers, which do not always provide plants with the necessary nutrition. Therefore, the optimisation of potash fertiliser application levels and examination of current soil testing methods was made a foundation for the research project jointly organised by the International Plant Nutrition Institute (IPNI) and the D. Pryanishnikov All-Russian Research Institute of Agrochemistry, which started in autumn 2012. In the current issue of “Key Element” we present the results of the second year of the research.

We would welcome your feedback, comments and questions and will try to address them in our next issues. Please contact us at **pr@msc.uralkali.com**.

Kind regards, **Oleg Petrov,**
Uralkali Director of Sales and Marketing

Potash market overview 2014

2014 was characterised by solid global potash demand and firming potash prices. Major markets have recovered much better than anticipated, led by lower year-on-year potash prices and distributor restocking needs. The growth of the potash market in 2014 was reflected in higher year-on-year operating rates. The potash industry is estimated to have run at 83-85% of global effective capacity, compared with 73% in 2013.

Potash demand has expanded in all regions, particularly in India, China and South East Asia in response to lower prices.

Global potash deliveries in 2014 exceeded 2011 levels and are estimated to have reached a record 62 million metric tonnes. Improved consumption and customers rebuilding stocks following the uncertainty of 2H 2013 were the key growth factors.

A combination of shipping backlogs and labour disputes in some regions led to tighter potash availability.

Benchmark fertiliser prices

		Annual averages			Quarterly averages	
		Jan-Dec	Jan-Dec	Jan-Dec	Oct-Dec	Oct-Dec
	Unit	2012	2013	2014	2013	2014
DAP[1]	(US$/t)	539.8	444.9	472.5	366.1	459.6
Phosphate rock[2]	(US$/t)	185.9	148.1	110.2	110.0	115.0
Potassium chloride[3]	(US$/t)	459.0	379.2	297.2	341.6	300.6
Urea[4]	(US$/t)	405.4	340.1	316.2	313.9	314.9

Source: World Bank

[1] Standard size, spot FOB US Gulf.
[2] Phosphate rock (Morocco), contract f.a.s. Casablanca.
[3] Standard grade, spot FOB Vancouver.
[4] FOB Eastern Europe.

Potash prices

	26 September 2014	3 January 2014
Potash – CFR Standard Bulk		
Southeast Asia CFR standard (US$/t)	300-330	320-345
India contract (US$/t)	369-375	322
China contract (US$/t)	-	-
Potash – CFR Granular Bulk		
Potash fob granular New Orleans (US$/t)	360	370
Brazil CFR granular (US$/t)	310-330	365-370
Europe CFR granular (€/t)	250-275	285-295

Source: Argus FMB, Fertecon

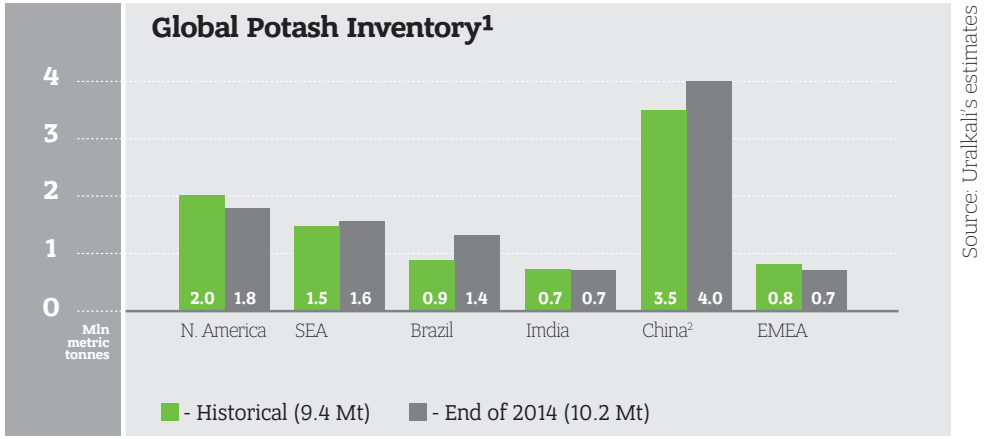
Potash market overview 2014

In China, potash demand was stronger than previously anticipated with higher optional volumes of seaborne imports delivered through 2H 2014. Demand is estimated to have grown by 20-24% to 14.0-14.5 million tonnes. Negotiations for the 1H 2015 Chinese seaborne contract are currently underway. The resumption of contract shipments to China is expected to boost market confidence.

In India, potash demand was also strong last year on the back of high levels of NPK application. A total of 4.3 million tonnes of KCl was imported during 2014, representing a year-on-year increase of 23%. Indian potash demand is expected to gradually recover, with consumption volumes reaching approximately 4.5-4.7 million tonnes in 2015. In addition, demand may be further supported by changes in the fertiliser subsidy structure aimed at balancing the application rates of NPK fertilisers within the framework of India's budget coming into force in April 2015.

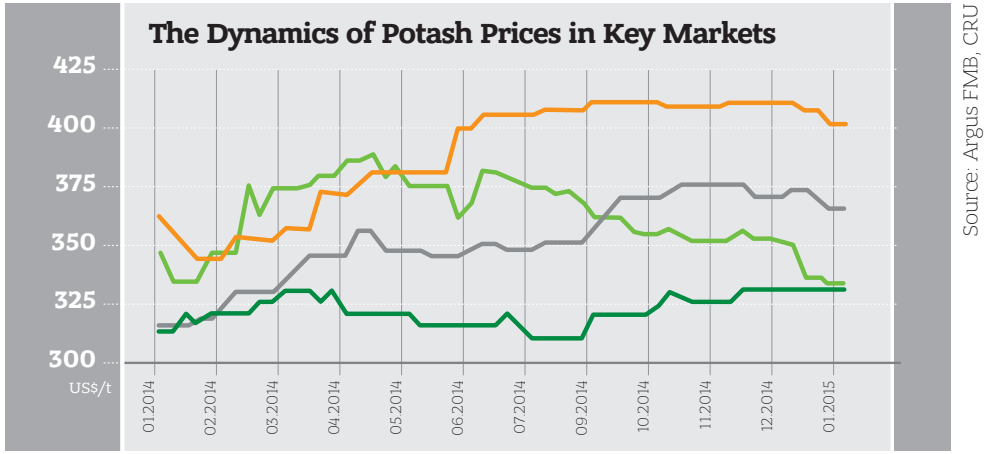
South East Asian markets were characterised by very strong demand and aggressive competition in 2014. The region is estimated to have imported 9.7 million tonnes last year compared to 8.1 million tonnes in 2013. Demand prospects for South East Asia in 2015 remain good. Despite lower year-on-year palm oil prices, palm oil economics are profitable and producers are expected to continue investing in potash to maximise returns.

In Brazil, demand for granular product was very strong, while availability was limited in 2014. Brazil imported a record 9.1 million tonnes of potash, representing a 20% increase over the previous year. Brazilian demand in 2015 is expected to be close to 2014 levels or slightly lower.



Source: Uralkali's estimates

[1] Inventories do not include domestic potash producers' stocks, excl. China
[2] Including domestic producers' stocks



Source: Argus FMB, CRU

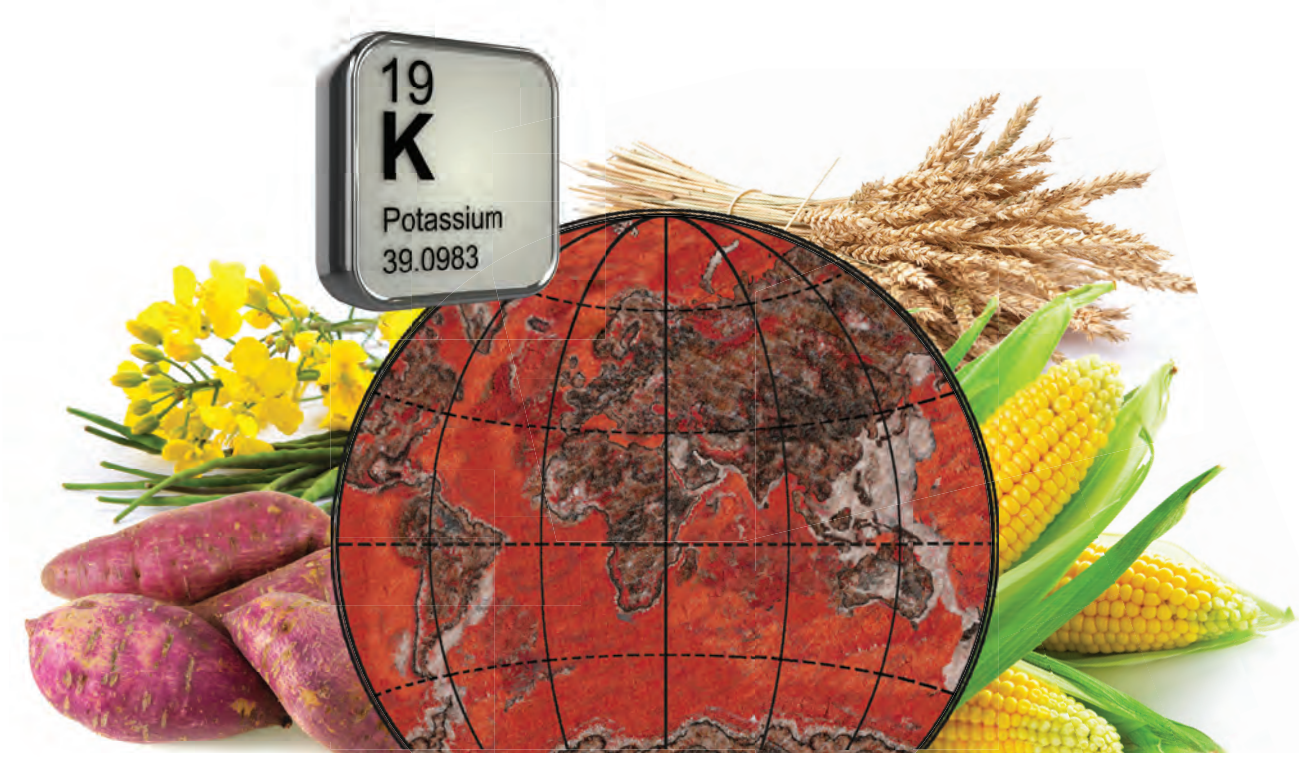
- Potash granular CIF NW Europe, US$/t
- Potash granular New Orleans barge, US$/mt
- Potash granular CFR Brazil, US$/t
- Potash standard CFR Southeast Asia, US$/t

Potash market overview 2014

North American potash demand was robust, as farmers replenished declining nutrient levels in their soils after record crop production in 2013. Full-year demand is estimated to have hit record levels of 10.0-10.3 million metric tonnes. 2015 potash demand in this region may decline slightly due to a modest reduction in corn planted acreage. However, lower nutrient levels after record 2014 crop production could be a catalyst for potash demand this year.

In EMEA and FSU (former Soviet Union) markets, demand is estimated to have grown by 3-4% to 12.1-12.3 million tonnes in 2014. In Europe, customer caution during the second half of 2013 led to robust demand in 2014 as buyers rebuilt depleted inventories and took advantage of bottomed prices. In 2015, EMEA demand is expected to stay largely unchanged or be slightly lower than in 2014. In Western Europe, demand may ease off slightly, as lower year-on-year grain prices may have some impact on demand. The FSU, Africa and Middle East markets are expected to demonstrate some increase in potash demand.

The Russian potash market remained stable in 2014, totalling 1.9 million tonnes. Potash consumption by Russian agricultural producers (including consumption of potash as part of NPK) amounted to more than 0.6 million tonnes, compared to approximately 0.45 million tonnes in 2013. Uralkali places special emphasis on supporting the development of the Russian agricultural sector. The Company ensures that its product and nutritional knowledge remains available for domestic customers during a turbulent period for the Russian economy.



After the record 2014,
Uralkali expects global potash demand
to decrease to 58-59 million tonnes in 2015.

Results of research project to improve potash fertiliser recommendations for intensive cropping systems in Russia in 2014

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A year ago, this journal published the first results of the joint project between the International Plant Nutrition Institute and the D.N. Pryanishnikov All-Russia Research Institute of Agrochemistry, launched in the fall of 2012. The project is focused on the optimization of potash fertiliser rates in current intensive cropping systems for crops that require high doses of K (sugar beet, grain maize, rapeseed and soybean), as well as checking the measurement potential of routine soil test methods depending on the regional soil properties and adjusting the current soil K test interpretation classes based on the results obtained from short-term field experiments carried out on large industrial farms (Ivanova et al., 2014). This paper presents the results obtained in the fall of 2014, the second year of study.

To continue the study of the response of sugar beet, rapeseed, soybean, and grain maize to potassium fertilisers, a second series of short-term field experiments was commenced in the fall of 2013 in the Central Chernozem (Lipetsk and Voronezh Central Agrochemical Services and Belgorod National Research University) and North-Caucasian (Rostov Central Agrochemical Service) regions. The experiments were set up on large industrial farms, where crop yields are higher than the regional average, on chernozems with medium to high plant-available potassium content. These experiments will last for two years in crop rotation. They will study the effect of four increasing K rates when used with an optimal dose of NP and under absolute control (without fertilisers). Potassium fertilisers were applied as granulated potassium chloride to crops with the highest potash need and in rotation.

In the fall of 2014, the effect of potassium fertilisers on the yields of target and by-products was assessed in experiments with the following crops: sugar beet and grain maize in Voronezh region; sugar beet and spring rapeseed in Lipetsk region, soybean in Belgorod region; and sugar beet and grain maize in Rostov region.

Each experimental treatment is applied three times and the residual effect of the single application rate of potassium fertilisers on the next crops in the crop rotation is studied.

The following treatments were used in the experiments with sugar beet: without fertilisers (absolute control); NP at optimal rates for each farm (background); background + K70 (K1); background + K140 (K2); background + K210 (K3); and background + K280 (K4).

In the experiments with the second crop, the following treatments were used: for grain maize – without fertilisers (absolute control); NP at optimal rates for each farm (background); background + K60 (K1); background + K120 (K2); background + K180 (K3); and background + K240 (K4); for soybean and spring rapeseed – without fertilisers (absolute control); NP at optimal rates for each farm (background); background + K30 (K1); background + K60 (K2); background + K90 (K3); and background + K120 (K4).

In addition, the residual effect of potassium fertilisers applied in the fall of 2012 for the previous crop in the first stage experiments (fall 2012–2013), the results of which were reported earlier (Ivanova et al., 2014),was also studied.

In 2014, due to comparatively more arid conditions during the vegetation period, the yield levels for all crops studied were much lower than in 2013. We will now examine in more detail the results obtained in each region.

Voronezh region

In the experiment performed in Voronezh region, a high yield (more than 50 t/ha) was obtained for sugar beet (Rosanta hybrid). It was found that potassium fertilisers had a positive effect, which increased the yield of sugar beet roots by 15–21% when applying double (140 kg K_2O/ha), triple (210 kg K_2O/ha), and maximum (280 kg K_2O/ha) potassium rates compared to the nitrogen–phosphorus background (Tab. 1). The sucrose content of the beet roots did not decrease due to the positive effect of potassium fertilisers, which ensured a corresponding increase in the sucrose yield from 6.7 to 8.0 t/ha (Fig. 1).

In the experiment with grain maize (Photo 1), the application of potassium fertilisers significantly increased the grain yield by 5–15% without the loss of quality. The maximum yield (3.6 t/ha) was achieved with the 120 kg K_2O/ha application rate treatment. The maximum yield increase due to K was 0.5 t/ha. As such, each kilogram of K_2O applied resulted in an additional 4 kg of grain maize.

In the experiment on the study of the residual effect of potassium fertiliser on spring wheat, a reliable increase in crop yield by 9–20% compared to the nitrogen–phosphorus background was obtained in the treatments with the double (140 kg K_2O/ha), triple (210 kg K_2O/ha), and maximum (280 kg K_2O/ha) potassium rates applied for the previous crop: sugar beet. The maximum yield of spring wheat (4.1 t/ha) was achieved with the maximum potassium rate treatment (280 kg K_2O/ha), and the grain quality corresponded to class I of soft spring (hereinafter, according to Russian standard GOST R 52554-2006), because the gluten content was 32% and the gluten deformation index (IDK) decreased to 75 units; in the other treatments, the grain quality was class II. The maximum yield increase due to the application of potassium was 0.7 t/ha. As such, each kilogram of K_2O applied resulted in an additional 2.5 kg of spring wheat grain.

In the experiment on the residual effect of potassium fertiliser on spring barley, a reliable increase in crop yield by 12–18% compared to the nitrogen–phosphorus background was obtained in the treatments with the triple (180 kg K_2O/ha) and maximum (240 kg K_2O/ha) potassium rates applied in the fall of 2012 for the previous crop: grain maize. The maximum yield increase due to the application of potassium was 0.8 t/ha. As such, each kilogram of K_2O applied resulted in an additional 3.3 kg of spring wheat grain.

The residual effect of potassium increased the weight of 1000 grains by 5%, as well as the grain's protein content. Protein content can be critical for the cultivation of malted barley varieties.

Photo 1. *Corn harvesting. Voronezh region.*

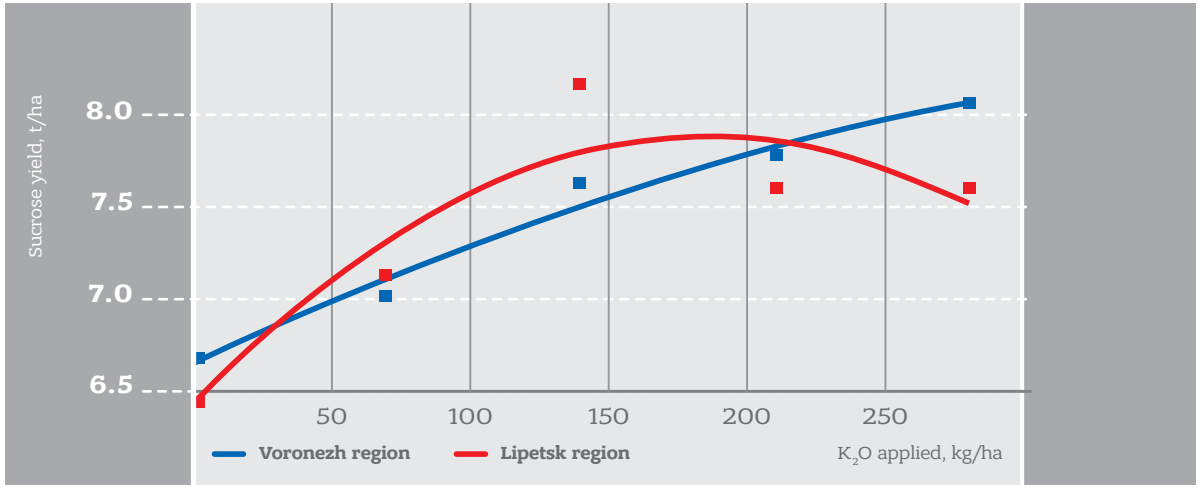

Figure 1. *Effect of K fertiliser application on sucrose yield in field experiments conducted in 2014.*

Lipetsk region

In the experiment with sugar beet (Ventura hybrid) performed in Lipetsk region, a medium yield (up to 36 t/ha) was achieved, and a positive effect from potassium fertilisers was noted with all application rates with a reliable increase in root yields by 7–14% compared to the nitrogen–phosphorus background. The sucrose yield increased by up to 26% (from 6.5 to 8.2 t/ha), which was due to both the increase in crop yield and sucrose content in beet roots by 3% on average compared to the NP background.

In the experiment with spring rape (Ratnik cultivar), a maximum yield of 1.25 t/ha was obtained. The potassium fertilisers ensured a reliable increase of rape yield by 6–28% compared to the nitrogen–phosphorus background. The yield increase was accompanied by the retention of oil content in seeds and an almost two-fold decrease in acid, which improved the shelf life of rapeseed in storage. The maximum yield increase due to potassium fertilisers was 0.15 t/ha. As such, each kilogram of K_2O applied resulted in an additional 2.5 kg of rapeseeds.

In two experiments on the residual effect of potassium fertiliser applied for the previous crop in rotation (sugar beet and rape) on winter wheat, a reliable increase in yield compared to the nitrogen–phosphorus background was observed in all experimental treatments. The yield increase due to the application of potassium fertiliser was 8–33%. The residual effect of potassium increased the protein content of wheat grain by 1–1.7%, the grain unit by 5–10 g, and grain hardness. The improvement in grain quality for the Bezenchukskaya-380 winter wheat cultivar led to class I grain in the residual effect treatments with the single (60 kg K_2O/ha), double (120 kg K_2O/ha), and maximum (240 kg K_2O/ha) potassium fertiliser rates applied for the previous crop (rape) in the fall of 2012. The maximum yield increase due to potassium fertiliser was 0.7 t/ha. As such, each kilogram of K_2O applied resulted in an additional 4 kg of wheat grain. The improvement in grain quality for the Moskovskaya-39 winter wheat cultivar led to class I grain in the residual effect treatments with the single (70 kg K_2O/ha), triple (210 kg K_2O/ha), and maximum (280 kg K_2O/ha) potassium fertiliser rates applied for the previous crop (sugar beet) in the fall of 2012. The maximum yield gain due to potassium fertiliser was 0.8 t/ha. As such, each kilogram of K_2O applied resulted in an additional 4.5 kg of wheat grain. In both experiments, grain of the lower class II was obtained in the background treatment with only nitrogen and phosphorus fertilisers.

Belgorod region

In the experiment with soybean (Lantsetnaya cultivar), a significant yield increase of 6–7% compared to the nitrogen–phosphorus background was achieved in the treatments with the application of 60–120 kg K_2O/ha (Photo 2). The maximum yield gain due to potassium fertiliser was 0.12 t/ha. As such, each kilogram of K_2O applied resulted in an additional 1.3 kg of soybeans. The soybean yield increase did not affect the quality: protein and oil content levels remained at 36% and 20%, respectively.

In the experiment on the residual effect of potassium fertilisers, a reliable increase in the yield of malted barley by 5–7% compared to the NP background was obtained in the treatments with the application of 60–240 kg K_2O/ha for the previous crop in rotation (grain maize) in the fall of 2012. The maximum yield increase due to potassium fertiliser was 0.3 t/ha. As such, each kilogram of K_2O applied resulted in an additional 1.6 kg of spring barley grain.

When the yield increased, the protein content of the grain remained stable at a level of 9.5–9.8%.

Photo 2. *Potash fertiliser application. Belgorod region.*

Rostov region

In Rostov region, the effect of potassium fertilisers on the yield of sugar beet was insignificant because of the high spatial variation of the data. However, an increase in sucrose content of 1% was observed in the potash fertiliser treatments, and the sucrose yield increased by 7–9% (up to 8.7–8.9 t/ha). In the experiment with grain maize, the reliable yield increase was 0.5 t/ha, or 8%, in the treatment with the application of 180 kg K_2O/ha. As such, each kilogram of K_2O applied resulted in an additional 3.0 kg of maize grain.

In 2014, a comparison of the economic efficiency of potassium fertilisers applied to different crops, taking into account the cost of granulated potassium chloride at 13,000 rubles/t, including the price of the fertiliser (11,000 rubles/t) and its delivery to the field (2,000 rubles/t), shows that sugar beet led to the most efficient fertiliser application. The maximum increase in revenue was 15,000 rubles/ha in Voronezh region and 5,000 rubles/ha in Lipetsk region. The maximum increase in profitability for sugar beet was 6% in Lipetsk region and 21% in Voronezh region.

For the cultivation of rape in Lipetsk region, the maximum increase in revenue was 380 rubles/ha at a fertiliser rate of 60 kg K_2O/ha, and profitability increased by 1%.

In the experiments on the residual effect of potassium application on cereals, a sustainable increase in profitability was obtained with the application of potassium fertilizers. The maximum increase in revenue compared to the NP background (4200–6075 rubles/ha), as well as the maximum increase in profitability, was obtained for winter wheat in Lipetsk region. For spring crops (barley and wheat), the maximum increase in revenue was 3000–3800 rubles/ha with the application of the triple and maximum potassium rates; profitability increased by 33–54% compared to the background treatment.

The results of this 3-year project will be summarized and published next year; however, from the results of the first two years, a practical conclusion can be drawn that the non-application of potassium fertilisers to chernozems with medium to high content of plant available K results in significant shortfalls of sugar beet, maize grain, rapeseeds, and soybeans. The application of potassium fertilisers not only increases the yield and improves the quality of these crops in the first year of application, but also has a significant positive residual effect on the yield and quality of cereals as the next crop in rotation (such as spring and winter wheat, barley).

Table 1. *Effect of potash fertilisers on yield increase in 2014.*

Direct effect of K applications, second series of field experiments		
Region	**Crop**	**Maximum yield increase due to K** (%)
Voronezh	Sugar beet	**24***
	Grain maize	**15**
Lipetsk	Sugar beet	**12**
	Spring rapeseed	**14**
Belgorod	Soybean	**7**
Rostov	Sugar beet	10
	Grain maize	8
Residual effect of K fertiliser (1 year after K application), first series of on-field trials		
Region	**Crop**	**Maximum yield increase due to K** (%)
Voronezh	Spring barley	**18**
	Spring wheat	**20**
Lipetsk	Winter wheat	**16**
	Winter wheat	**33**
Belgorod	Winter wheat	**4**
	Spring barley	**7**
Rostov	Winter wheat	**10**
	Winter wheat	**4**

** - Bold font – Statistically significant yield increase*

References:

S. Ivanova, V. Romanenkov, L. Nikitina.
First results of research project on the improvement of K fertiliser recommendations in intensive cropping systems in Russia. Key Element. #1 2014, pp. 6-10.

Uralkali participates in the 21st International Agro-Industrial Exhibition

In November 2014, Uralkali participated in the 21st international agro-industrial exhibition, YUGAGRO, which took place in Krasnodar, Russia. Overall, 613 companies from 31 countries participated in the exhibition.

At the Uralkali exhibition stand (Photo 3), agricultural producers – starting from farmers and up to major agro-holdings – could receive a consultation about the balanced use of fertilisers and the specifics of potash fertilisers from the Company's professional agronomists.

Alexey Nazarenko, representative of Uralkali in the South Region, an agronomist-consultant and Master of Agriculture, gave a speech on the efficiency of potash fertilisers as part of a seminar on the problems of fertiliser science in the region (Photo 4). In his speech, Mr. Nazarenko described the situation with the potash level of soils indifferent regions of Russia, showed the dynamics of the decrease of exchange potassium in the soils of the South Region of Russia and delivered experimental data showing the role of potassium in obtaining a high yield of main crops and an increase of quality of the products.

Photo 3. *Representatives of Uralkali Marketing Service at the Uralkali exhibition stand.*

Photo 4. *Alexey Nazarenko, an agronomist-consultant at Uralkali, gave a speech on the efficiency of potash fertilisers.*