Potash market overview in 1H 2015

Key Element

Balancing K use in cereals in India

Uralkali increases black pepper yields in Vietnam

Uralkali Market Analysis Report
In 1H 2015, the potash market faced the twin challenges of a tough agricultural environment and inventory drawdown after a solid buildup last year.

Modest demand and strong competition among suppliers put pressure on the prices in the spot markets in 2Q 2015.

Contract markets – India and China – demonstrated healthy demand in the first half of the year. However, devaluation of local currencies against US dollar and regulatory measures can constrain further demand growth.

At the same time, in India inadequate and imbalanced application of nutrients, especially of potash, by the cereal growers leads to less crop productivity and food grain production. One of the major reasons is with the lack of recommendation protocol suitable for small-scale resource challenged farmers. Nutrient Expert® (NE) provides balanced fertiliser recommendation suitable for varied yield target and farmer resource availability. The recommendation from NE guides farmers to apply the required amount of K along with other nutrients to increase productivity and enhance economic benefit. Read more about the NE project on page 5 of the current issue of “Key Element”.

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 in 1H 2015

The potash market was relatively weak in 1H 2015. Volumes remained under pressure in major spot markets due to the tough agriculture environment and inventory drawdown after a solid buildup last year. Pricing trended negatively throughout 1H 2015 in spot markets on the back of lackluster demand and strong competition among suppliers.

In China, potash suppliers continue to deliver volumes according to 2015 contracts. Chinese fertiliser VAT introduction along with Yuan depreciation may negatively impact import volumes this year.

In India, shipments from FY 2015/16 contracts continue to arrive at the ports. In January-July 2015, India imported 2.3 million tonnes of KCl, an increase of 9% compared to the corresponding period last year. The depreciation of the Indian rupee against the US dollar, subsidy issue, and the monsoon deficit may affect importers and may influence the full-year potash import figure. India is expected to import 4.3-4.5 million tonnes of KCl in 2015 compared to 4.5 million tonnes last year.

Demand in Southeast Asia & Oceania was relatively strong while the competition among suppliers was strong in 1H 2015. Southeast Asia is currently out of buying season. Demand is expected to return by late September/October. The upside to potash demand in the region is limited due to local currency weakness, low palm oil prices, and competitive pricing from suppliers. The region is expected to import 9.5-9.6 million tonnes of KCl this year vs. 10.2 million tonnes of KCl in the previous year.

Benchmark fertiliser prices

<table>
<thead>
<tr>
<th></th>
<th>Annual averages</th>
<th>Quarterly averages</th>
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<tbody>
<tr>
<td></td>
<td>Jan-Dec</td>
<td>Jan-Dec</td>
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<tr>
<td>Unit</td>
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<tr>
<td>DAP¹</td>
<td>(US$/t)</td>
<td>539.8</td>
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<tr>
<td>Phosphate rock²</td>
<td>(US$/t)</td>
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<tr>
<td>Potassium chloride³</td>
<td>(US$/t)</td>
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<tr>
<td>Urea ⁴</td>
<td>(US$/t)</td>
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</tbody>
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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

<table>
<thead>
<tr>
<th></th>
<th>4 January 2015</th>
<th>27 June 2015</th>
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<tbody>
<tr>
<td>Potash – CFR Standard Bulk</td>
<td></td>
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<tr>
<td>Southeast Asia CFR standard (US$/t)</td>
<td>330-350</td>
<td>300-330</td>
</tr>
<tr>
<td>India contract (US$/t)</td>
<td>322</td>
<td>332</td>
</tr>
<tr>
<td>China contract (US$/t)</td>
<td>305</td>
<td>315</td>
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<tr>
<td>Potash – CFR Granular Bulk</td>
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<tr>
<td>Potash fob granular New Orleans (US$/t)</td>
<td>405-411</td>
<td>352-358</td>
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<tr>
<td>Brazil CFR granular (US$/t)</td>
<td>370-380</td>
<td>330-340</td>
</tr>
<tr>
<td>Europe CFR granular (£/t)</td>
<td>280-295</td>
<td>298-305</td>
</tr>
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</table>

Source: World Bank

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In Latin America, tight credit availability in Brazil, weak crop prices, currency volatility against US dollar and inventory destocking were forcing down farmer demand in the region and causing a drop in potash prices amid strong competition in the region. In the first six months of 2015, Brazilian potash imports fell 21% y-o-y to 3.2 million tonnes. Potash demand in the region is expected to fall to 9.8-10.0 million tonnes in 2015 compared to 11.8 million tonnes in 2014.

EMEA potash demand is expected to decline to 11.0-11.1 million tonnes compared to 12.3 million tonnes in the previous year. Most of the drop can be attributed to softer demand in Europe. In 1H 2015, European potash demand is estimated to have declined by 7-10% during 1H 2015 due to lower y-o-y grain prices and discretionary nature of potash application. FSU and African markets are expected to demonstrate a slightly increase in potash demand this year.

In Russia, potash consumption declined y-o-y in 1H 2015 due to deferred demand as prices increased y-o-y following the rouble devaluation.

In North America, potash demand in the first half of 2015 is estimated to have been below average mainly due to delayed planting season, high potash price volatility because of strong competition, and lower corn planted acreage. The upside to potash demand in 2H 2015 is limited due to crop price environment. North American potash demand is expected to decline by 14-16% year-on-year totaling 8.6-8.7 million metric tonnes.

Uralkali expects global potash demand to be down in 2015 to 58 million tonnes from 63 million tonnes in 2014, reflecting industry destocking and lower grain price environment.
Balancing K use in Cereals through Nutrient Expert®: Improved Yield, Higher Profit, and Reduced GHG Emission

Authors: Dr. Kaushik Majumdar – Director - South Asia Program, IPNI
Dr. T Satyanarayana – Deputy Director - South Asia Program, IPNI
Dr. Sudarshan K. Dutta – Deputy Director - South Asia Program, IPNI

Inadequate and imbalanced application of nutrients, especially of K, by the cereal growers of India leads to less crop productivity and foodgrain production of the country. One of the major reasons of this drawback is associated with the lack of recommendation protocol suitable for small-scale resource challenged farmers. Nutrient Expert® (NE) provides balanced fertilizer recommendation suitable for varied yield target and farmer resource availability. The recommendation from NE guides farmers to apply the required amount of K along with other nutrients to increase productivity, enhance economic benefit and reduce green house gas emission from farm fields.

The fertilizer consumption in India has increased significantly since last four decades. The Total NPK (N, P₂O₅, and K₂O) consumption increased twelve times, from nearly 2 million to 25.5 million tonnes between 1969-1970 and 2011-2012 (FAI, 2014). However, there was a disproportion of the consumption ratio among these nutrients. Nitrogenous fertilizer accounted for nearly 66 per cent of total nutrient consumption in the country (Majumdar et al., 2014); while P₂O₅ and K₂O shares were only 26 and 8 per cent, respectively (FAI, 2014). This is a serious concern particularly in cereal-based cropping systems where removal of K is equal to or more than N. Inadequate K application results in a negative input-output budget of K that ultimately leads to the mining of soil K reserve (Dutta et al., 2013), adversely affecting crop productivity.

Imbalanced fertilizer application or more specifically less K application in crops is identified as one of the major reasons for decreasing crop response to fertilizer application and the consequent lower crop production growth rate in India. There are enough scientific evidences that highlight the role of K in the yield improvement. Large number of on-farm trials across the Indo-Gangetic Plains showed that no application of potassium reduced average grain yield of rice, wheat and maize by 621, 723 and 699 kg/ha, respectively (Majumdar et al., 2012). Significant yield improvements (up to 2 t/ha yield increase) were also reported in a rice-wheat cropping system by addition of potassium across Indo-Gangetic plain (Majumdar et al., 2014).

Common abbreviations and notes:
K = potassium, N = nitrogen; P = phosphorus; t = tonnes; NE = Nutrient Expert®; GHG = Greenhouse Gas; GS = Green Seeker; GWP = Global Warming Potential.

Agropage: Balancing K use in Cereals in India
Despite the proven economic, social, and environmental benefits of balanced fertilization, the application of potassic fertilizers is yet to gain the momentum as expected among the cereal growers. This could be attributed to the unavailability of a wide scale recommendation mechanism that is suitable for fertilizer prescription to the small-scale farmers and can be used by the frontline extension professionals.

In smallholder systems of India, farmers cultivate small pieces of land, and crop management varies widely depending on farmer awareness and resource availability. Such variable management decisions create large spatial and temporal variability in soil nutrient availability between farm fields. Ideally the fertilizer management in such smallholder landscape should vary and be location-specific to avoid over- or under-use of nutrients. Among several existing fertilizer use practices in India, farmers’ fertilization strategies generally lack the necessary integration of information on soil nutrient supply and crop nutrient requirement. State fertilizer recommendations are based on response studies that are extrapolated to large areas, and the spatial and temporal variability in soil nutrient supply between farms is not addressed adequately. In both cases, potassium remained the neglected element, which caused economic loss due to unrealized crop yields (Singh et al., 2013, 2014).

Researchers have successfully used the Site-Specific Nutrient Management (SSNM) principles to ascertain the balanced application rate of nutrients to achieve high yields in cereals in on-farm situations (Witt et al., 1999; Setiyono et al., 2010; Chuan et al., 2013). However, large-scale implementation of SSNM strategies in farmers’ fields remained a challenge. IPNI recognized that the lack of an appropriate tool to help farmers and their advisors to quickly develop field-specific recommendations is the major hindrance in on-farm implementation of SSNM. This led to the synthesis of historical and current on-farm nutrient response data by IPNI to develop a fertilizer decision support tool that is easy-to-use and can work with or without soil test results. IPNI was supported in this effort by the International Fertilizer Industry Association (IFA), International Maize and Wheat Improvement Center (CIMMYT), and a large number of national partners, ranging from National Research and Extension Institutes, Agricultural Universities, State Agriculture Departments, Fertilizer and Seed Industries, and other Non Governmental Organizations (NGO). The outcome of this effort is a dynamic nutrient management tool, the Nutrient Expert® (NE), that can generate farm-specific fertilizer recommendation for major cereals such as maize, wheat, and rice, based on the principles of SSNM (Pampolino et al., 2012). This tool utilizes information of the growing environment to provide balanced fertilizer recommendations that are tailored for a particular location, cropping system and farmer resource needs.
availability. The NE tool advocates external application of nutrients, based on indigenous soil nutrient supply and crop nutrient requirement, to achieve a target yield suitable for an individual farmer. Expected outcome from the NE-based balanced and location-specific fertilizer recommendation could be several including improved yield, higher nutrient use efficiency or saving of fertilizer and consequent improved economics of production, and environmental stewardship of applied nutrients.

The preliminary target crops for NE development were cereals considering that more than three fourth of the cultivated land in India are under the three major cereals, rice, wheat and maize. These three crops are the major contributors to the total fertilizer consumption in India. At present, NE for wheat and hybrid maize is developed, validated, and released for free public use, while NE for rice is under nationwide validation with government research and extension organizations. Cotton, sugarcane and soybean are the other three target crops for developing NE in near future.

The NE is a MS Access based computer application that consists of four or five different working modules depending upon the crop; for maize there are five modules while for wheat and rice there are four modules. Through the different modules, and based on farmers’ inputs to simple questions, the NE tool estimates the indigenous nutrient supplying capacity of the farmer’s field (i.e. contribution from crop residue recycling, addition of organic manures, residual benefit from the previous crop), determines yield responses to application of major NPK nutrients and finally arrives at the most appropriate nutrient recommendation adequate for obtaining the targeted attainable yield. There is an option within this dynamic tool to lower down the yield target considering the resource availability and input purchasing ability of the farmer, and the recommendations are generated on the new lower targeted yield. The nutrient recommendation for a particular field is transformed into fertilizer sources available at farmer’s doorstep and finally a 4R compliant (Right Source, Right Rate, Right Time and Right Place) recommendation report is provided to the farmer. A cost analysis associated with the SSNM and the farmers’ practice suggests whether or not the fertilizer recommendation intervention would be profitable.

Validation trials of NE – Maize and NE – Wheat were conducted across the major wheat and maize growing areas of India. The NE-based recommendations were compared to the existing fertiliser recommendation practices such as farmers’ fertilisation practices (FFP) and state recommendations (SR) in these trials. The three treatments were implemented side-by-side in the same farmer’s field where each plot size was ≥ 100 m².
The NE - Maize based fertilizer recommendation significantly improved grain yield as compared to FFP and SR across 535 different locations of India (Figure 1). The nutrients recommended by NE slightly increased N application and decreased P rates over the existing practices. However, NE recommended significantly higher amount of K than FFP or SR; 24 kg/ha over FFP and 15 kg/ha over SR (data not shown). The Nutrient Expert® tool assesses the cropping system nutrient balance based on nutrient application in previous crop (fertilizer + organic manure) and yield of previous crop, and recommends fertilizer rates based on target yield of the current crop. In most situations across 535 sites, the NE tool estimated less than required potassium application in FFP and SR in the cropping system and recommended higher K2O rates. The results outlined the lack of K application by existing fertilizer management practices even in a crop like maize that removes large amount of K from the soil. The lack of K application has been flagged earlier as one of the main reasons for decline in maize yield in major production zones of Bangladesh (Timsina et al., 2013).

Figure 1. Average maize grain yield in Nutrient Expert® validation trials (n=535) in India

Figure 2. Comparative nutrient application rates in farmers’ fertilization practices (FFP), state recommendations (SR) and Nutrient Expert®-Maize tool-based recommendations (NE) in validation trials
In the case of wheat, average grain yield was highest (4927 kg/ha) in the NE-based recommendation as compared to FFP (4079 kg/ha) and SR (3897 kg/ha) in the farmers' field validation trials (n = 858) (Fig. 3). The effect of adequate K application on wheat grain is clearly shown in Figure 4. Across all sites, the N and P2O5 rates recommended by NE are either equivalent or less than FFP and SR. However, NE recommended additional 57 and 34 kg/ha of K2O than the FFP and SR recommendations. This highlights significant imbalance in wheat nutrient management adopted by farmers and balancing application rates with required amount of potassium increased grain yield by about 1 t/ha. Most of the validation trials in wheat were done in the Trans-Gangetic Plain region of India including the states of Punjab and Haryana. The farmers in this region typically apply inadequate amounts of K to crops because of the perception that the soils in this region has adequate available potassium due to its illitic mineralogy and high K addition through irrigation water. However, the results of our study clearly indicate significant yield advantage in wheat with balanced and adequate K application.

Figure 3. Average wheat grain yield in Nutrient Expert® validation trials (n=858) in India

Figure 4. Comparative nutrient application rates in farmers’ fertilisation practices (FFP), state recommendations (SR) and Nutrient Expert®-Wheat tool-based recommendations (NE) in validation trials
Dutta et al., (2014) reported on-farm validation trials (n = 109) of NE-Wheat that assessed the suitability of the Nutrient Expert® tool to provide recommendation for conventional and zero-till wheat. Establishment of wheat under zero-till conditions is gaining popularity to reduce the turn-over time between rainy season rice and winter wheat. Several new innovations in machinery now allow smallholder farmers to plant wheat on standing residue of the previous rice crop.

The reported study assessed 65 on-farm trials under conventional tillage (CT) and 44 trials under zero tillage (ZT) condition, and compared the results of farmers’ fertilizer practices with NE-based recommendations. Results showed a significant (p ≤ 0.01) increase in wheat yield through NE recommendations over FFP (Figure 5).

It was also observed that there were significant increase in K application through NE based recommendation over FFP under both ZT and CT situation (Figure 6). The B:C ratio of NE treatment was four fold higher than that of FFP (Dutta et al., 2014).

Figure 5. Grain yield of wheat across different nutrient management and tillage practices. Yield with different letters are significantly (p ≤ 0.01) different

Figure 6. Fertilizer K₂O rates across different treatments while considering all the locations. Dose with different letters are significantly (p ≤ 0.05) different
Apart from yield improvement and improving economics, the NE-based recommendations also reduced the Greenhouse Gas (GHG) emission from farm fields in Northwestern India. A recent study (Sapkota et al., 2014) in wheat highlighted that NE recommendation reduced the emission of the GHGs that leads to less Global Warming Potential (GWP). The study showed that the estimated GWP per unit wheat grain yield as well as per USD net return was significantly (P< 0.01) affected by nutrient management strategies.

Farmers’ fertilization practices resulted in higher GWP per Mg of wheat yield while NE-based recommendation, in conjunction with “Green Seeker” (GS) based N application, resulted in the lowest GWP per Mg of wheat (Figure 7). NE in combination with GS helps in better nutrient use efficiency from in-season precision N application i.e. rate and number of splits matching physiological demand of the crops. This probably reduced the residual NO₃-N in soil profile thereby minimizing the N loss as N₂O emission. In addition, the adequate K application recommended by NE helps in better utilization of other nutrients, particularly N, that improves N utilization by the crops and reduces the possibility of volatilization loss of the nutrient.

Overall, Nutrient Expert® (NE) based fertilizer recommendation helped the farmers to increase the yield and improve economics through site-specific balanced application of nutrients. The on-farm results clearly highlighted the critical role played by K in improving cereal productivity in India. Balanced and adequate application of potassic fertilizer not only helped in yield improvement but may also reduce K mining from soils. Therefore, wide scale adoption of Nutrient Expert® could be the way forward towards balanced fertilizer application in smallholder systems in India for sustainable food security.
References


Regional news: VIETNAM

Uralkali increase black pepper yields in Vietnam

Vietnam is the world’s largest producer and exporter of black pepper with a market share of close to 35%. Potash is known to be «an element of quality» and optimal potash nutrition has a positive impact on various parameters, such as yield and the size of peppercorns; it increases the concentration of essential oils; and improves resistance to disease and pests.

In 2014, Uralkali and the Soils and Fertilizer Research Institute (SFRI) initiated a large-scale comprehensive study examining the impact of optimal doses, forms and timings of potash applications on the yield and quality of black pepper. The experiments were carried out in the central highlands of Vietnam in the provinces of Dak Lak, Gia Lai and Dak Nong, as well as in the south-eastern provinces of Dong Nai and Binh Phuoc. These provinces account for over 85% of the pepper-growing areas in Vietnam. As for the sites, both experimental plantations of the SFRI and farmers’ plantations were chosen. This allows research to be conducted at the highest level and means that the findings can be implemented on farmers’ plantations as quickly as possible.

In the first year of the study, the researchers noticed a significant visual difference between pepper cultivated with the recommended doses of potash and those with the doses conventionally used by local farmers. When potash was applied in the recommended doses, the spikes were fully developed, the plants were almost unaffected by fungal disease and retained their vegetative mass after harvesting (this led to an increase in yields of 15-20%). Use of conventional methods resulted in the replacement of up to a third of the plants that did not survive harvesting.

The photos highlight the difference, for spikes and pepper plants overall, when using

**Photo 1.** Conventional technology used by farmers

**Photo 2.** Optimal potash nutrition recommended by Uralkali
Alexey Shcherbakov, Agronomy Director at Uralkali, said: «Assisting farmers in making decisions about the most effective use of fertilisers is based on the results of our field research, conducted in collaboration with leading research institutes in Vietnam, as well as in close cooperation with government representatives responsible for the development of regional recommendations for fertiliser application».

«The complex research carried out as part of a joint project with the SFRI will facilitate the development and implementation of the most advanced technology for fertiliser application in black pepper plantations. Thanks to the support of local authorities, it will be completed as soon as possible and in all major areas where the crop is cultivated». 