

Emily Marchand

Tutorial: Monday 8:30

AGR 1110

Due: November 24, 2014

Molybdenum Fertilizer

Part One- Product Information

Molybdenum (Mo) is a micronutrient that helps plants absorb nitrogen and phosphorus better and is only needed in small doses. It only needs to be applied once every 3-4 years and at a rate of approximately 50-100g/ha (Farmer Community, 2012). If plants have access to these nutrients, they will produce better yields. Plants can't convert nitrates into amino acids, so with this fertilizer, the plant will be able to do so (Alpine, 2010). In Figure 1, you can see that molybdenum is needed in many crops for optimal growth, helping the crop use nitrogen and converting the nitrates into amino acids, essential for the plant growth.

Figure 1.

Micronutrient Responses

Crop	Mn	B	Cu	Zn	Mo	Fe
Alfalfa	M	H	H	L	M	M
Barley	M	L	M	M	L	H
Dry Beans	H	L	L	H	M	H
Corn	M	L	M	H	L	M
Oats	H	L	H	L	L	M
Grass	M	L	L	L	L	H
Potatoes	H	L	L	M	L	
Rye	L	L	L	L	L	
Wheat	H	L	H	L	L	L
Canola	M	H	H	M	L	
Peas	H	L	L	L	M	

Legend: H ... High M ... Medium L ... Low

http://www.alpineplantfoods.com/western_canada_micronutrients.html

The fertilizer can either be applied to the seed before planting so the farmer does not have to add it on later, or if it is not put on the seed, farmers can apply the fertilizer to the plants in the field by either spraying it on the leaves of the plant, or directly to the root. It comes in a white powder or flakes from Alpine called ALPINE MicroBolt Mo. Alpine is located in Canada and the United States but this product would come from the Canadian plants since this is a benefit to Canada. Alpine contacts and more information about the company can be found at <http://www.alpineplantfoods.com/>. In Canada, molybdenum is produced in British Columbia, which could contribute to Canada exporting to Nepal for this project. The molybdenum is harvested as a by-product of copper mining and is also mined by itself. In some cases, this means that molybdenum harvesting is environmentally sustainable since it is a readily available by-product. A project to take place in the near future in British Columbia will create more jobs in the Canadian market and also produce large amounts of molybdenum. This will benefit the Canadian economy because there are great amounts of molybdenum in mines in Canada, which will employ more Canadians and when it is exported, this will bring in revenue. The machines that are involved in molybdenum harvesting and processing are drills, shovels, loaders, trucks, dozers, graders, and crushers (InfoMine 2014). Molybdenum is very rare to find in soils and if it is, most of it is not useful to plants because it is in a form that they can't use. Molybdenum levels are also low in acidic soil. Bacteria in the plant are much more molybdenum needy rather than the plant itself due to nitrogen fixation. Because of this, legumes show molybdenum deficiency much earlier than other crops because legumes have high bacteria levels to help in that of the nitrogen fixation (Farmer Community, 2012).

Part Two- Export Potential to Nepal

Nepal is located between the borders of China and India. Its population is roughly 27.8 million people. The currency that is used in Nepal is rupees. One Canadian dollar is equivalent to around 88 rupees. The landscape in Nepal varies greatly throughout the country, making it difficult to grow some crops. In relation to Canada, the agriculture is much different. In Canada, we have technologies that can help us with growing different crops in areas that may not be suitable for that crop. In Nepal, they don't have any modern technology to help them with farming, everything is done by hand. Nepal produces less than a 0.7 t/ha yield of legumes (Pandey et al., 2000). It may be cheaper for the Nepalese to buy from China, given that it is roughly \$2000-\$3000 US/ton for the Boron Molybdenum Chelate Fertilizer rather than the range of \$20000-\$40000 CAD/ton for the molybdenum oxide in Canada.

Figure 2.



<http://www.infomine.com/investment/metal-prices/molybdenum-oxide/1-year/>

Figure 2 is showing the varying range of price for molybdenum oxide in Canada. As stated before, molybdenum prices are much higher than that of China. If the Nepalese wanted to buy this product from Canada, it would be best for a village or community to share the fertilizer, since it is very expensive especially since Nepal is a third world country, they may not be able to afford it. Nepalese who may be hurt by this product could be farmers that cannot afford the fertilizer, creating a problem for their yields that continue to be under 0.7 t/ha. Others that could be hurt by this product could be the residence living near the application of this product. If there is water runoff with this fertilizer in it, the residents could potentially consume parts of this product if the water is unfiltered or dirty. The labour that would be needed for this product is the application of the fertilizer to the plants, in this case, the legume plants. The application could be as easy as broadcasting, or as labour intensive as direct fertilization as to putting the fertilizer right on the plant manually. This product could have the potential to sell very well because it could increase yields dramatically of legume plants, but the downside to this product is it is very expensive, especially for individual farmers in Nepal. If this product was to be sold from Canada to Nepal, there would have to be financial help for the Nepalese or an intense drop in price for molybdenum fertilizer from Canada. Also, transportation would be much greater to buy from Canada to Nepal, costing the farmers even more than just the cost of the fertilizer. China would be a better buy for the Nepalese farmers because the transportation cost would be very low and the price of the fertilizer would also be much lower than buying it from Canada. China's price of molybdenum is much cheaper than Canada's because China is a larger producer of molybdenum than Canada. There is some competition in the world of molybdenum production. Colorado has large amounts of molybdenum because of the Rocky Mountains, which is the largest molybdenum mine in the world, mining around 30-40 million pounds per year (Leading the

World in Moly., n.d.).Canada is the fourth largest producer of molybdenum in the world, producing 7 million kg of molybdenum per year but China is above that, so they have more to offer, at a lower price (Duchesne, L. et al., 2013). In South Asia, molybdenum deficiency is a major factor for chickpea growth reduction. It is proven that molybdenum helps the growth and yield of chickpea production (Johansen et al., 2006). The importing nation, Nepal, will benefit greatly due to this fertilizer because Nepalese farmers can use molybdenum fertilizers for better growth of the legumes. With this in effect, it will have a positive impact on the population in regards to more crop to sell or feed to the farmer's family.

Future studies that would be essential to the exportation of this molybdenum fertilizer from Canada to Nepal are the exact costs of transportation and the price of the molybdenum fertilizer at the time of purchase. Also an alternative method to produce this product to cut down the cost so Nepalese farmers can afford this and potentially have better growth and yields to produce more crop, especially legumes.

In order for this market in Canada to be competitive with producers in China, where molybdenum fertilizer is cheaper, the potential Canadian exporters will have to find a new and cheaper way to harvest and process molybdenum into fertilizer to be in the running for Nepal purchasers. Nepal could be an importing nation of this product from Canada if there was to be possible funding from the government in order to have this product bought for Nepalese farmers to use it. Without this, farmers would not be able to afford this product from Canada and would have to buy from China, which is still fairly expensive to the Nepalese, or not use the fertilizer at all. If in the future Nepal becomes a wealthier country in general, there could be potential exporting of this product from Canadian companies that produce it to Nepalese farmers.

References:

Alibaba. (2014). Micronutrients boron molybdenum chelate fertilizer. Retrieved 11/22, 2014, from http://www.alibaba.com/product-detail/Micronutrients-boron-molybdenum-chelate-fertilizer_1431513742.html?s=p

Alpine. (2010). Micronutrients. Retrieved 11/20, 2014, from http://www.alpineplantfoods.com/western_canada_micronutrients.html

Duchesne, L., Fong, D. G. & Bokovay, G. (2013). Molybdenum. Retrieved 11/21, 2014, from <http://www.thecanadianencyclopedia.ca/en/article/molybdenum/>

InfoMine. (2014). 1 year molybdenum prices and price charts. Retrieved 11/21, 2014, from <http://www.infomine.com/investment/metal-prices/molybdenum-oxide/1-year/>

International Molybdenum Association. Molybdenum market information. Retrieved 11/22, 2014, from <http://www.imoa.info/molybdenum/molybdenum-market-information.php>

International Molybdenum Association. (2014). Molybdenum in agriculture. Retrieved 11/21, 2014, from http://www.imoa.info/download_files/sustainability/IMOA_Micronutrient.pdf

International Molybdenum Association. (2014). A small amount of molybdenum has a big impact. Retrieved 11/21, 2014, from <http://www.imoa.info/sustainability/molybdenum-contribution-to-sustainability.php>

Farmer Community. (2012). Molybdenum. Retrieved 11/21, 2014, from <http://farmercommunity.incitecpivotfertilisers.com.au/Articles%20and%20Publications/Nutrient%20Facts/Molybdenum>

Pandey et al., 2. (2000). Legumes in nepal. (pp. 71)

Johansen et al., 2. (2006). Seed priming with molybdenum alleviates molybdenum deficiency and poor nitrogen fixation of chickpea in acid soils of bangladesh and india., 1.

Leading the world in moly. (PDF). Arizona, USA: