

# Assessment of the Export Potential of Canadian Herbicides to Nepal

Jake Schoonjans

This paper was prepared to discuss the benefits of exporting of Canadian herbicide chemicals to Nepal. The chemical that I chose to focus on is a herbicide chemical called Barricade. This report includes not only the benefits to Nepal but to Canada as well. It also includes a description of the product and cost. The benefits that come from the result of this product being brought into Nepal can also be used in other developing countries to improve the highly needed agriculture sector.

## **Part 1 – Product Information**

### **Barricade II Description:**

Barricade II is a herbicide that is produced by DuPont (Raise the Bar, 2016). Barricade II is produced/distributed in Mississauga Ontario at E.I. du Pont Canada Company. There are many different types of Barricade herbicide but the one that will be focused on in this paper is Barricade II. The reason why this chemical is more acceptable than other chemicals is because they are used for weed control in wheat. Barricade II is a selective herbicide which means that it will only kill certain plants (How do selective herbicides work, 2015). In the case of the Barricade it selectively kills at least 22 different broad leaf weed species (Base,2016). It also includes 4 ingredients from Groups 2 and 4 (Base, 2016). Based off of this information *Table 1* can be used to see that Barricade targets the ALS enzyme (acetolactate synthase) and Auxin mimics. ALS or the acetolactate synthase enzyme is a catalyst that is used by plants that need to use the amino acids eucine, isoleucine and valine and without these essential amino acids the plant will die. (Cellular Absorption of Herbicides, 2016). Wheat is considered a cereal plant. Barricade does not kill cereal plants but will kill the weeds that maybe be growing in between them (Base, 2016). This is why Barricade is a perfect herbicide to be used for weed control in wheat fields.

**Table 1: Herbicide Groups**

|                | <b>Target site</b>           | <b>Active Ingredient</b> | <b>Product Names</b> |
|----------------|------------------------------|--------------------------|----------------------|
| <b>Group 1</b> | ACCase<br>(grass herbicides) | Clethodim                | Select               |
|                |                              | Clodinofof               | Horizon              |

|                |               |                 |   |
|----------------|---------------|-----------------|---|
|                |               | Diclofop        | Hoegrass, Hoegrass II*  |
|                |               | Fenoxaprop      | Fusion, Laser, Laser DF*, Puma, Triumph Plus*   |
|                |               | Fluazifop       | Fusion, Venture   |
|                |               | Quizalofop      | Assure  |
|                |               | Sethoxydim      | Achieve, Achieve Extra*   |
|                |               | Tralkoxydim     | Poast, Poast Flaxmax*   |
| <b>Group 2</b> | ALS           | Ethametsulfuron | Muster  |
|                |               | Imazamethoabenz | Assert  |
|                |               | Imazamethapyr   | Pursuit   |
|                |               | Metsulfuron     | Ally  |
|                |               | Thifensulfuron  | Laser DF, Refine Extra*, Triumph Plus*  |
|                |               | Triasulfuron    | Amber, Unity*   |
|                |               | Tribenuron      | Express, Refine Extra*  |
| <b>Group 3</b> | Cell division | Ethalfurlain    | Edge  |
|                |               | Trifluralin     | Advance, Fortress, Rival, Treflan   |
| <b>Group 4</b> | Auxin mimics  | 2,4-D           | 2,4-D, Attain*, Champion Plus*, Dycleer*, Estaprop*, Thumper*, Tordon 202C*, Turboprop* |
|                |               | 2,4-DB          | Caliber, Cobutox, Embutox   |
|                |               | 2,4-DP          | Diphenoprop, Estaprop   |
|                |               | Clopyralid      | Lontrel, Prevail*, Curtail*, Poast Flaxmax*   |
|                |               | Dicamba         | Banvel, DyVel, DyVel DS, Target   |
|                |               | Fluroxpyr       | Attain*   |
|                |               | MCPA            | MCPA, Achieve Extra*, Buctril M*,   |

|                  |                                  |            |   |
|------------------|----------------------------------|------------|---|
|                  |                                  |            | Cahmpion Plus*, Dyvel*, Laser*, Laser DF*, Mirage*, Poast Flaxmax*, Stampede CM*, Target*, Triumph Plus*, Tropotox* |
|                  |                                  | MCPB       | Tropotox*   |
|                  |                                  | Mecoprop   | Mecoprop, Compitox  |
|                  |                                  | Picloram   | Tordon  |
| <b>Group 5</b>   | PSII inhibitor                   | Cyanazine  | Bladex, Blagal  |
|                  |                                  | Metribuzin | Crossfire*, Lexone, Sencor  |
| <b>Group 6</b>   | PSII inhibitor                   | Bromoxynil | Achieve Extra*, Buctril M*, Hoe-Grass II*, Laser, Torch/Pardner, Unity*   |
| <b>Group 7</b>   | PSII inhibitor                   | Linuron    | Afolan, Lorex   |
| <b>Group 8</b>   | More than one target             | Triallate  | Avadex BW, Avenge Fortress  |
| <b>Ungrouped</b> | Each are ungrouped and unrelated | Glyphosate | Laredo, Renegade, Roundup, Rustler, Touchdown, Wrangler   |
|                  |                                  | Bentazon   | Basagran  |
|                  |                                  | EPTC       | Eptam   |

(Martin, 2004)

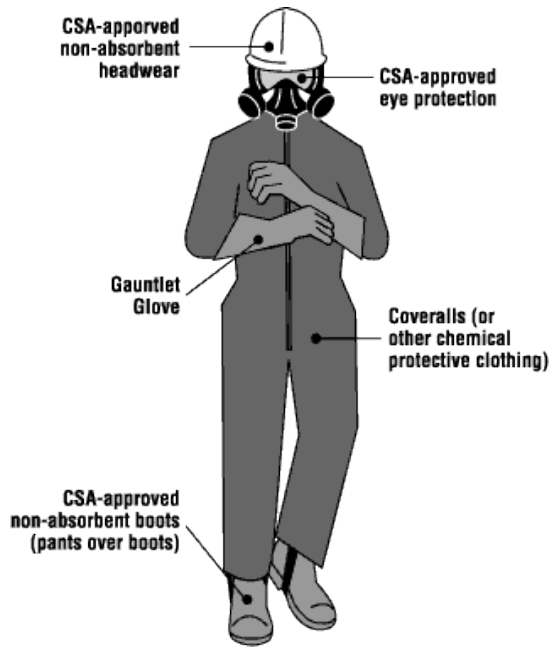
### **Machinery Required and Cost:**

The preferred way of application here in Canada and North America is odiously using a large sprayer that is either pulled by a tractor or self-propelled. In Nepal having one of these huge sprayers is obviously not practical because of the steep terrain, large cost, and small fields. Instead of these big sprayers there is an alternate option. Backpack sprayers (as seen in Image 1) are not only the most practical way of spraying the field but also the much cheaper option and are already a common tool for small farmers, such as farmers in Nepal. Backpack sprayers run on average about 100 Canadian Dollars and can be used to apply the herbicide to the crop. It

only takes one person to use the backpack sprayer so it is not like employees will need to be hired by the farmer which helps to cut down on cost. Another essential piece of equipment is safety equipment to protect the person applying the herbicide from the harsh chemicals. Safety equipment that is required is gloves, a respirator, goggles, rubber boots, and coveralls (as seen in Image 2). All of these items can be purchased not at too high of a cost. After using the equipment, it will have to be either thrown out or properly cleaned. This will assume the farmer does not come into contact with the chemical and he/she will remain unharmed. If the farmer was did come into contact with the chemical it could cause them to experience mild symptoms that may include nausea and headaches, rashes or more dangerous symptoms, such as convulsions and seizures, and even death (Gavin, 2015). Another input that will be needed is a supply of filtered water to mix with the herbicide and dilute it. Diluting the herbicide is very important. By doing this herbicide is not wasted and is also not applied to the crop with too high of a concentration (Using Herbicides Safely, 2016). The reason why the water must be filtered is so that small pieces of debris or dirt does not clog the backpack sprayer and cause problems for the user. By using these cheap and easy to use methods it can take a farmers crop for good too great when harvest season comes around.



**Image 1** (<https://www.homedepot.ca/en/home/p.4-gal-echo-diaphragm-backpack-sprayer.1000807835.html>)



**Image 2** ([http://www.ccohs.ca/oshanswers/safety\\_haz/landscaping/pesticides.html](http://www.ccohs.ca/oshanswers/safety_haz/landscaping/pesticides.html))

**Market Opportunity:**

As far as herbicide chemicals go in Nepal currently there are not a lot of businesses that carry/sell them (Www.business1.com). This mean that there is defiantly a potential market for herbicide chemicals. As seen in *Table 2* for the years of 2009 to 2010 the market went up. Based off of this data it is safe to say that Nepal is defiantly discovering the advantages when using herbicide chemicals. This rising demand for herbicide chemical will have a positive effect on how beneficial it will be for Nepal to import Barricade II from Canada.

As far as competitors go such as China or India importing herbicides. It is still a very small part of agriculture in Nepal (based off that nothing can be found about the usage of herbicides in Nepal agriculture) and it is not like Nepal has a lot of herbicides coming in from one or two countries. This gives Canada a good chance at striking a deal with Nepal on the importation of herbicides such as Barricade II.

**Table 2: Nepal Herbicide Imports in 2009 and 2010**

| Year | Trade Value | Weight (kg) | Quantity  |
|------|-------------|-------------|-----------|
| 2009 | \$2,809,579 | 325,818     | 325,818   |
| 2010 | \$3,132,597 | 2,057,349   | 2,057,349 |

(<http://www.indexmundi.com/trade/imports/?commodity=380830&country=np>)

### **How does Barricade II Provide Benefits in Canada?**

By exporting Barricade II to Canada it would result in plenty of beneficial outcomes. The first one being an increase in jobs. When the amount of Barricade II went up the plant would need to hire more people to help with the increase in demand. Jobs would also be created in the transportation part of the exporting process. There would be more work for truck drivers and the ship yard workers. Another way that Canada would benefit from exporting Barricade II is that it would bring money in to the economy which can help out huge. Lastly it would help to improve Canadas export stats.

### **Reference:**

Base. (2016, February 09). DuPont Launches New Barricade® M Herbicide. | Farms.com. Retrieved November 23, 2016, from <http://www.farms.com/news/dupont-launches-new-barricade-m-herbicide-103563.aspx>

Cellular Absorption of Herbicides. (2016). Retrieved November 23, 2016, from <http://passel.unl.edu/pages/informationmodule.php?idinformationmodule=1130447094&topicorder=4&maxto=13&mintto=1>

Gavin, K. S. (2015, November 13). How Herbicides Affect People. Retrieved November 24, 2016, from <http://www.livestrong.com/article/199337-how-herbicides-affect-people/>

How do selective herbicides work? (2015). Retrieved November 26, 2016, from <http://agriculture.vic.gov.au/agriculture/farm-management/chemical-use/agricultural-chemical-use/chemical-residues/managing-chemical-residues-in-crops-and-produce/how-do-selective-herbicides-work>

Martin, C. (2004, March 24). How Herbicides Work. Retrieved November 24, 2016, from <http://mtwow.org/How-do-herbicides-work.html>

Raise the Bar on Your Broadleaf Weed Control. Retrieved November 22, 2016, from <http://www.dupont.ca/en/products-and-services/crop-protection/cereals-protection/products/barricade.html>

Using Herbicides Safely. (n.d.). Retrieved November 29, 2016, from <http://www.lawn-care-academy.com/herbicides.html>

Www.business1.com, B. B. (n.d.). Herbicide Suppliers (Companies) in Nepal. Retrieved November 25, 2016, from <http://www.pesticides1.com/herbicide-suppliers/nepal.html>

## **Part 2 – Export Potential to Nepal**

### **Introduction to Nepal:**

Nepal is a small country located in South Central Asia. It has a current population of just under 29 million people (Nepal Population, 2016) and has an area of 147,181 km<sup>2</sup> (Nationsonline.org, 2016). The capital city of Nepal is Kathmandu. The official language in Nepal is called Nepali. Nepal can be divided up into three different ecological zones: the highland, midland, and lowland (Nationsonline.org, 2016). Nepal also has 8 of the 14 highest summits in the world (Nationsonline.org, 2016). The steep terrain can make it very hard for farmers to find a suitable place to farm crops. This is why most of the farming takes place in the lowland region. About 64% of Nepal's population is employed in the forestry/agriculture field (Kästle, 2016). This accounts for 34% of Nepal's annual GDP (Kästle, 2016). As you can see agriculture is a huge part of Nepal and there is always room for improvement.

### **Transportation:**

As far as shipment goes the herbicide can be transported from Mississauga Ontario to Vancouver by J&R Hall Transport. From Vancouver it will be taken to India. The preferred option is defiantly to take it straight to Nepal but Nepal is a land lock country. Therefore, the ship cannot deliver the herbicide straight to a Nepalese Port. Once the herbicide has made it to India it will be taken from the port in India by a truck all the way to Kathmandu, Nepal. Once arriving in Kathmandu the product will be able to be spread across the country in smaller shipments. These smaller shipments will be taken to stores all around the country where it can be purchased by farmers all around the country. By having a bunch of local stores for the farmers to purchase the herbicide it will minimize the struggle that the farmers will have to go through to get the herbicide onto their farm.

### **Storage:**

In order to store the herbicide it must be in an area that is away from all the people and animals. One option is to have a dedicated metal cabinet for all herbicides (such as the one seen in Image 3). The reason for the cabinet being metal is so that it does not absorb any of the chemicals and cause future safety problems (Kisielewski, 2015). There should also be some type of warning on the cabinet that indicates that the products inside are hazardous and can cause mild symptoms that may include nausea and headaches, rashes or more dangerous symptoms, such as convulsions and seizures, and even death (Gavin, 2015). Another way to assure safety and that

the products inside don't go bad is to have some sort of vent system so that fresh air can get into the cabinet (Kisielewski,2015). If the farmers follow all of these storage suggestions/rules it will ensure that they get the most out of their Barricade II herbicide.



**Image 3** (<http://www.storagenstuff.co.uk/details.cfm?product=364>)

**Cost:**

To really understand the full benefit of introducing herbicide chemicals such as Barricade II to Nepal an example will be given. If a Nepalese farmer had a 10-acre field. On average it cost about \$30 to spray a hectare of wheat. The cost of wheat per ton in Nepal is currently at its lowest it has been in a long time at \$161 Canadian dollars (Wheat Price Daily, 2016). In Nepal when herbicides are used the average yield is 1.4 tons of grain per hectare. As explained in part A that farmers can lose 68%–100% of their grain because of weed grown in their fields (Subedi, 2016). If a farmer happened to lose 80% of the grain production due to not spraying herbicides on his/her field and weed populations taking over and competing with the wheat they would only end up with 0.28 tons of wheat per hectare. In the end the farmer would only get 2.8 tons of wheat from the 10-acre field. He/She would have a profit of \$450 Canadian Dollars. On the other hand, if a farmer was to spray his field at \$30 dollars a hectare but averaged 1.4 tons of grain per hectare. He/She would end up with a net profit of \$1,954 (after deducting the cost of spraying). In the end the farmer would end up with over 4 times the amount of profit. Not only would it gain profit for the farmers but it would also cut down on the back breaking work of using a hoe to get rid of the weeds. Farmers in Nepal can't afford not to use herbicides.



### **Benefits to Nepal:**

Nepal will benefit in many ways by importing Barricade II into the country. The first one being less labour intensive work will be required by the farmer because he/she will not have to walk through the field and pick all the weeds by hand weekly. All they will have to do is use the backpack sprayer to spray down the crop once and the field will remain weed free for the rest of the crops life. Another benefit to Nepal is its increased revenue (as shown under the cost subheading). The farmers will produce more grain which results in the farmer receiving more money per growing season. The last way that importing herbicides into Nepal will benefit is it will result in there being more food for the citizens of Nepal. About 32.5% of Nepal's population are living under the poverty line (Nepal, 2016). Therefore, Nepal is a very poor country and a lot of the citizen's money goes towards buying food for their families (Nepal, 2016). If Nepalese farmers are able to produce more grain then ever before by using Barricade II it would help to bring down the cost of food for the citizens because there would no longer be as great of a demand for wheat in Nepal (Prasad, 2011). As a result the citizens of Nepal would not have to spend as much money on food and they would have more money left over to do other things such as renovations to their homes.

Link to flow chart that show the benefits to both countries:  
<http://cloud.smartdraw.com/share.aspx/?pubDocShare=370EC04A93D94DB7F1CBA6BD57DF6F47AC8>

### **Import/Export Documentation Required:**

Nothing was found based on any permits required to export of herbicides from Canada. But the environment Canada government department deals with all substances that can pose a threat to the environment (Other Government Departments and Agencies, 2014). By contacting that department, they could get the required permit needed to export herbicides from Canada. As far as permits go for importing the herbicides into Nepal no information could be found making it unclear as to if permits are required by Nepal's government or not.

One form of documentation that will be required is that in order for farmers to purchase the herbicide is an herbicide licences. This licence shows that the farmer has taken and passed a course that teaches the farmers about the importance of safely using the herbicide as well as how to and when the herbicides should be used. In Canada you must have a licence in order to

purchase a herbicide. This assures that not only the farmer is safe while using the herbicide but also assures that the environment does not suffer from the herbicide. Obviously this would be a hard thing to organize in a country like Nepal where most people don't even go to school but if there was a group of people that went around from city to city and hosted these courses to all the local farmers it would make it very easy for the farmers to get the documentation to purchase and use herbicide chemicals.

### **Canadian Government Loans/Grants:**

In Canada there are plenty of government grants and loans that are available to help start up this export idea. Some links to websites are listed below. Another option is to get money from DuPont. DuPont is not a small company and defiantly will take the initiative to chip in some money if they see the benefit to Canada, Nepal and their own business.

- [https://app.thinkingcapital.ca/cibc/?utm\\_source=google&utm\\_medium=cpc&utm\\_campaign=BusinessLoansCanada&adid=100442299472&addisttype=g&kw=business%20funding%20canada&matchtype=\(matchtype\)&gclid=Cj0KEQIA6\\_TBBDRIInaPjhcelt5oBEiQApPeTFy0j4SXZKkPpajPPbcNjd3hHpz6EAbAOISRD\\_MwhJZkaAlIN8P8HAQ](https://app.thinkingcapital.ca/cibc/?utm_source=google&utm_medium=cpc&utm_campaign=BusinessLoansCanada&adid=100442299472&addisttype=g&kw=business%20funding%20canada&matchtype=(matchtype)&gclid=Cj0KEQIA6_TBBDRIInaPjhcelt5oBEiQApPeTFy0j4SXZKkPpajPPbcNjd3hHpz6EAbAOISRD_MwhJZkaAlIN8P8HAQ)
- [http://www.canadiangrantsbusinesscenter.com/Funding-Finder.html?gclid=Cj0KEQIA6\\_TBBDRIInaPjhcelt5oBEiQApPeTF6iIHsBFDwaSVwrrwVEU6-rdmnalhCmGyekpyDLexiAYaAkYq8P8HAQ](http://www.canadiangrantsbusinesscenter.com/Funding-Finder.html?gclid=Cj0KEQIA6_TBBDRIInaPjhcelt5oBEiQApPeTF6iIHsBFDwaSVwrrwVEU6-rdmnalhCmGyekpyDLexiAYaAkYq8P8HAQ)
- [http://www.canadiangrantsbusinesscenter.com/Funding-Finder.html?gclid=Cj0KEQIA6\\_TBBDRIInaPjhcelt5oBEiQApPeTF6iIHsBFDwaSVwrrwVEU6-rdmnalhCmGyekpyDLexiAYaAkYq8P8HAQ](http://www.canadiangrantsbusinesscenter.com/Funding-Finder.html?gclid=Cj0KEQIA6_TBBDRIInaPjhcelt5oBEiQApPeTF6iIHsBFDwaSVwrrwVEU6-rdmnalhCmGyekpyDLexiAYaAkYq8P8HAQ)

### **Potential Buyers and Canadian Companies:**

#### E.I. du Pont Canada Company

1919 Minnesota Crt, Mississauga, ON L5N 0C9  
(905) 816-3300

#### J&R Hall Transport

Head Office: (519) 632-7429

**Matt Budd** - Operations Manager

[mbudd@jrhall.ca](mailto:mbudd@jrhall.ca)

## Aeron International Nepal

Address: Kathmandu, Nepal

Kathmandu, 00977

Nepal

Type: Distributor, Exporter, Importer, Manufacturer, Trader

Products / Services: Agriculture Supplies

Aeron International Nepal is a company that is located in Kathmandu Nepal and is a distributor, exporter, importer, manufacturer, and trader of agriculture products ([www.business1.com](http://www.business1.com), 2016). Aeron International Nepal is into everything agriculture and is a defiant target for selling the herbicides to farmers located in Nepal. Not only are they a well-known company but they also get a lot of customers. This will improve the chance of the herbicide Barricade II being sold in Nepal.

### **People that may be Affected by the Herbicide:**

Some people do not like having the food they eat sprayed by chemicals such as Barricade II. They would rather have a plant that was grown organically. This means that there were no chemicals used and no inorganic fertilizers used at any time during the crops life cycle. In Nepal people that only eat organic food may have to look a lot harder for their food if Barricade II was brought into the country for farmers to use. This could result in those people having to spend more money on food and they also may have to go to several different markets just to get their organic grain products.

### **Conclusion:**

All together as a whole I think that if Barricade II was shipped from Canada to Nepal there would be many different benefits to both countries. In the end the main goal of this project was not only to benefit Canada but to mainly help Nepal improve their field of Agriculture. By adding Barricade II to the line of products available to Nepal's farmers it would achieve this goal of improving the agriculture field in Nepal.

### **References:**

Gavin, K. S. (2015, November 13). How Herbicides Affect People. Retrieved November 24, 2016, from <http://www.livestrong.com/article/199337-how-herbicides-affect-people/>

Kästle-nationsonline.org, K. (2016, April 15). Agriculture and Food Security. Retrieved November 26, 2016, from <http://www.nationsonline.org/oneworld/first.shtml>

Kisielewski, P. (2015, April 14). Herbicide Storage Requirements. Retrieved November 27, 2016, from <http://www.uschemicalstorage.com/news/herbicide-storage-requirements/>

Nepal. (n.d.). Retrieved November 25, 2016, from <https://www.feedthefuture.gov/country/nepal>

Nationsonline.org, K. K. (2016). Nepal. Retrieved November 29, 2016, from <http://www.nationsonline.org/oneworld/nepal.htm>

Nepal Population. (2016, November 26). Retrieved November 26, 2016, from <http://countrymeters.info/en/Nepal>

Other Government Departments and Agencies: Reference List for Exporters. (2014, March 28). Retrieved November 25, 2016, from <http://www.cbsa-asfc.gc.ca/export/reflist-listeref-eng.html>

Prasad, S. K. (2011). Supply and demand for cereals in Nepal, 2010--2030. Retrieved November 29, 2016, from <http://microdata.worldbank.org/index.php/citations/4408>

Subedi, H. (n.d.). Wheat Weed Identification And Management Under Cereal ... Retrieved October 17, 2016, from <http://www.wscholars.com/index.php/jss/article/download/470/pdf>

Wheat Daily Price. (2016, September 30). Retrieved October 17, 2016, from <http://www.indexmundi.com/commodities/?commodity=wheat>

Www.business1.com, B. B. (n.d.). Aeron International Nepal. Retrieved November 27, 2016, from <http://aeroninternational-np.business1.com/>