

The Dart Compact No Till Seed Drill

For The Nepalese Marketplace

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The Product

The Dart is a compact five foot, mechanically operated no till seed drill designed, manufactured and assembled by the Clean Seed Capital Group- based in Burnaby, British Columbia- who uses all Canadian materials (W. Jensen, personal communication, October 6, 2014). The idea behind this technology is



Figure 1- The Dart (<http://www.cleanseedcapital.com/dart5.html>)

specifically geared towards developing nations which do not have access to large scale machinery and/or still participate in broadcast planting or hand planting of traditional crops: maize, rice, mustards, wheat, barley, beans, potatoes and beets (W. Jensen, personal communication, October 6, 2014). Not only would this product significantly improve yields but also lower manual labour inputs of women and children who are generally responsible for crops in third world countries (Joshi *et al* ., 2012).

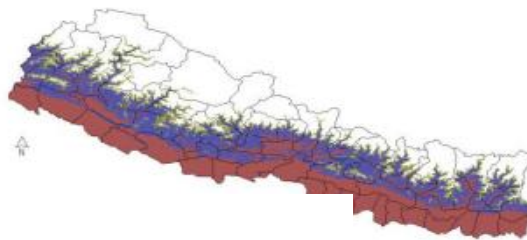


Table 1- Geographical areas of Nepal (Joshi *et al* ., 2012)

Agroecological domain	Altitude range (m)	Local names for the region	Importance in terms of agricultural production
Terai and river basin	80–600	<i>Terai, Tar, Bensī, Phant, Khonch, Kachad</i>	Most important
Low hills	600–1,000	<i>TalloPahad</i>	Third most important
Middle hills	1,000–1,600	<i>Deurali, Hatiya, Madhya Pahad</i>	Second most important
High hills	1,600–2,300	<i>Lekh, Kharka</i>	Fourth most important
Mountains	>2,300	<i>Himal</i>	Least important

Though this machine is “small” in industrial perspective, it would have a tremendous impact in the diverse agricultural systems seen throughout Nepal. Being only five feet wide and completely mechanical, means that the Dart is; lightweight, rugged/versatile, consistent, low maintenance and suitable for year round use (W. Jensen, personal communication, October 6, 2014). Amazingly only 15 horsepower (hp) is needed to pull this machine (W. Jensen, personal communication, October 6, 2014). This

can be accomplished obviously with a small tractor but also with a team of four oxen (Paudyal *et al.*, 2001). The availability of oxen over tractors may be beneficial not only in saving fuel input costs (which would approximately be 936 Nepal rupees/ha- using a 15hp machine) but also if versatility is considered (Paudyal *et al.*, 2001). In Nepal, crops are grown in many different areas that include wet soils (rice paddies), steep slopes (foothills of the Himalayas) and narrow strips (terai). In all these systems tractors would not be very efficient for obvious reasons; however, oxen can be, and are currently being used in all these situations (Paudyal *et al.*, 2001). With the addition of wide turf tires to the

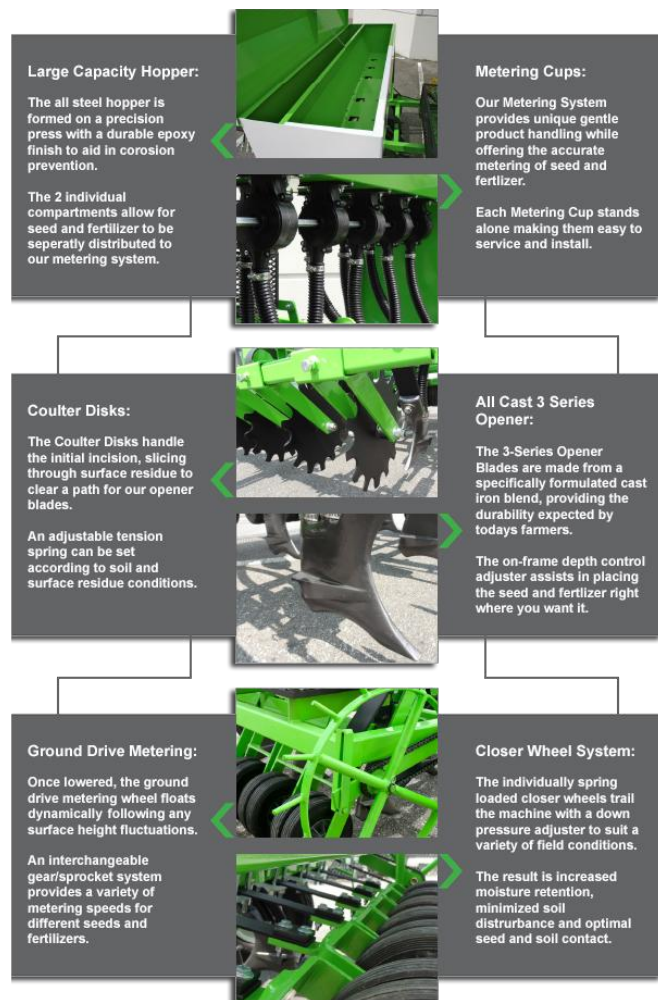


Figure 2- Key features of the Dart (<http://www.cleanseedcapital.com/dart5.html>)

Dart it would move easily through saturated fields, not slide on steep slopes and its narrow design would work perfect for planting in small strips; all the while providing consistent seed spacing and depth. A variety of row spaces are possible thanks to the systems innovative ground-drive metering system which lays seeds according to the size of sprocket being used (W. Jensen, personal communication, October 6, 2014). The simplicity of the planter's design and its mechanical function are very simple compared to that of commercial planters commonly found throughout the developed world; consequentially, this results in low maintenance, easy repairs (if needed) and overall dependability in any season.

Cost and Market

The average Nepalese farmer gross income is approximately 300000 Nepal Rupees (Nr); unfortunately, (with shipping) the Dart would cost about 750000 Nr (Cargo Experts, 2014) (Joshi *et al.*, 2012). It is this price that keeps the popularity of this machine (along with many other new technologies) away from struggling agricultural nations throughout the globe. However, in the next decade a niche market opportunity may present itself in Nepal for small pieces of equipment such as the Dart. In Nepal many subsistent farmers (who make up 80% of the population) have begun to realize that by joining together in cooperative groups allows for advancement: especially in funds and in turn technology (R. Khalan, personal communication, October 3, 2014). Currently there are several large cooperative farm groups across Nepal and this number is growing; therefore, it is only a matter of time before they begin to look for more efficient tools/machinery to propel their "large" operations (Joshi *et al.*, 2012). When this occurs versatile and dependable machines will be sought after- giving the Dart the opportunity which it deserves. However, it is important to note that because one planter is likely to be shared amongst many farms, one cannot expect to sell thousands of units but instead maybe a couple dozen a year.

Canadian Benefits

Not only would Clean Seed Capital and their employees reap the rewards of increased sales but also the multiple manufacturers that supply the company with materials: steel, plastic, rubber, etc. The publicity that the company would receive after sending their machine to a developing nation like Nepal may have an exponential affect on sales to other struggling countries in Asia, which in turn would lead to even more sales and overseas trade. If this were to happen, Canada as a whole may benefit. Increased trade between these countries could lead to stronger ties- which could better current trade agreements- and overall relations with one another. Note that specific supplier names could not be released to the public.

Transportation Analysis and Logistics

To get this product to Nepal will require several steps. First a sea container would have to be leased and the planters loaded into it- 5 assembled planters should be able to fit into a 52 foot container (Cargo Experts, 2014). Next the container would have to be trucked twenty minutes from Burnaby to Vancouver Harbour where it could then be loaded onto a freightliner. Over the following 3-4 weeks the ship would make its way west and eventually unload at Kolkata Sea Port, India. Once here the container (with the planters) could be loaded directly onto a freight train and sent 1500km north to Nepal's capital, Kathmandu (Cargo Experts, 2014). Ideally at this point the planters could be distributed to customers/ retailers from an already established business, preferably an agricultural equipment dealer, such as Aeron International Nepal (Business Portals, 2014). The cost to ship this product (using these methods) would cost approximately 900000 Nepal Rupees (Cargo Experts, 2014). The only way to cut costs (while still delivering assembled planters) would be to ship them openly, without a container. However,

this could be problematic because they would be exposed to salt water along the journey which could compromise the planters. Unfortunately, the cost of shipping is the biggest obstacle in making this machine available to developing and remote areas of the globe. If a cheaper method of transportation was developed then the Dart would be a profitable item to Clean Seed Capital and Nepalese retailers. Until this happens only the largest farm co-operative groups will be able to afford this specific planter making it unlikely that Clean Seed Capital would actually see Nepal as a profitable marketplace because they would have to guarantee the sale of at least two planters (out of five) to pay for shipping costs. Note that because this import is not classified as living, chemically or environmentally hazardous, it does not require any specialized documentation to enter the country of Nepal (Cargo Experts, 2014).

Nepalese Benefits

In Nepal women and children are responsible for maintaining crops while men generally work strictly with livestock, machinery (if any) and/or work off the farm (Ladha and Garrity, 1994) (R. Khalan, personal communication, October 3, 2014). Since the Dart is a no till planter it could reduce the manual labour of women and children significantly rather it be cultivation, seeding, weeding or fertilizing while still increasing profitability of farm. To understand how effective this product would be one must realize the benefits of no-till planting: it reduces weeds, prevents the need to cultivate (very costly in fuel, time and/or labour), reduces erosion and fertilizer runoff (which benefits the environment), helps to retain soil nutrients and raises yields per acre- which could benefit those in rural or urban areas. Basically, as listed above, the Dart's biggest use is as a "time and labour saver". It has been calculated that a Nepalese farmer could go from a planting time of 4-7 days (depending on the crop, cultivation techniques, labourers, etc.) per 1 hectare (ha) to an astonishing 2-3 hours (W. Jensen, personal communication, October

6, 2014) (Paudlay *et al.*, 2001)! This would obviously reduce input costs and manual labour (especially of women and children) by far. An increase in yield would also be observed when compared to areas that used broadcast seeding techniques which have been proven to be very inefficient (Joshi *et al.*, 2012).

Marketing in Nepal and Competition

Table 2- Seed producers of Nepal (Joshi *et al.*., 2012)

Indicator	Seed supply		
	Rice	Maize	Wheat
Area (million ha)	1.55	0.82	0.73
Total seed requirement (t)	93,000	20,000	87,600
Supply by National Seed Company Ltd. (%)	0	0	4
Supply by 11 private seed companies (%)	2	2	2
Supply by cooperatives and groups (%)	3	7	2
Farmers' own seed (%)	96	92	92

Sources: Data for area, total seed requirement, and supply by NSCL are from national statistics (NMoF, 2010); data for supply by private seed companies, cooperatives, groups, and farmers themselves are from surveys conducted for this study.

As mentioned, the target market in Nepal would be the cooperative groups that currently control approximately 15% of the seed market for maize, soy and wheat (Joshi *et al.*, 2012).

Being able to sell the Dart to this niche group could prove difficult because of its price.

However, through demonstrations, trials and leases in multiple areas (rice paddies, steep slopes, etc.) hopefully the Nepalese buyers could see the benefit of having such an efficient/time saving machine! From here cooperatives could advertise the idea of “custom planting” to farmers in the area. Convincing farmers that the cost of having seeding done by someone else would save; labour efforts/costs, improve yields and allow for more time to be allotted to other priorities would be key to gaining customers. Once again, using demonstrations along with visual statistics (graphs) would be the best method of advertisement for the majority of the low-educated Nepalese farmers who may not understand more complicated statistics (ANOVAs and t-tests). To do this a sales representative with knowledge/ experience with/of no till planting would likely

have to be hired and sent into the more rural areas of the country. It is also a possibility for charitable organizations like the World Wildlife Fund (WWF) could provide capital investment to lower the costs of retail of the first dozen machines delivered. In turn, they could then take a royalty payment (of some discussed amount) from any future sales in that area.

The concept of no till planting may come as a surprise to many Nepalese farmers since there is no similar products available to them. Fortunately, for Clean Seed Capital, the only competition comes from a United States company: Land Pride. They too specialize in small (under 10 feet) no till planters but do not provide any machines that do not require the



Figure 3- Land Pride Compact Drill (<http://www.landpride.com/product-search/compact-drills/32>)

use of at least a 35 horsepower tractor (Land Pride, 2014). These hydraulic and less mechanical planters not only would be less economical/ versatile for the Nepalese but also cost approximately 1 million Nepal Rupees (without shipping), or greater (Land Pride, 2014). Consequentially, the Dart has no significant competitors in the Nepal marketplace.

Future Recommendations for Clean Seed Capital

The Clean Seed Capital Group should invest some of their efforts and funds into marketing towards developing nations as well as setting up an assembly plant in some of these areas. This would provide jobs for locals and reduce shipping costs tremendously. Also it would be very beneficial for them to see if some of the materials used to form the Dart can be replaced

with something cheaper but still as reliable- possibly materials found in these developing parts of the world.

Future Research

More quantitative research must be done! This would include further investigation into overall transportation costs, profit margins and market size. This would increase the chance of successful retail and distribution of the compact no till planter across Nepal and other developing nations. A person with market understanding and experience in developing nations (like Nepal) would be essential to do this.

Conclusion

Despite this product's large price tag, the Dart could fit perfectly into Nepal's future agricultural system. If purchased by a group of farmers, the amount of time and theoretical money savings could be put towards other needs/priorities. For Canadians, not only would sales of this product benefit the Clean Seed Group but also all the companies in which it receives materials from- steel manufacturers, plastic moulders, tool and dye companies, etc. (W. Jensen, personal communication, October 6, 2014). Overall, this century old planting technology could help Nepal (and other developing nations) grow into a more sustainable/ efficient country.

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