



**vineland**  
RESEARCH & INNOVATION CENTRE

# Commercialization of Flower Bulb Planting Automation

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Request for proposal(s)

June 15<sup>th</sup>, 2017

Prepared by Vineland Research and Innovation  
Centre



## Background on the Organization (Vineland)

With a highly-skilled research team, oversight from an independent Board of Directors, engagement from an international Science Advisory Council and collaboration with more than 160 global partners including a Stakeholder Advisory Council, Vineland's goal is to enhance Canadian growers' commercial success through results-oriented innovation. We are an independent, not-for-profit organization funded in part by Growing Forward 2, a federal-provincial-territorial initiative.

Vineland's vision: A vibrant, prosperous and sustainable horticulture industry working with innovation to fill our world with fruits, vegetables, flowers and plants.

Vineland's mission: Enriching people's lives through science and discovery in horticulture.

Vineland's Robotics and Automation program was initiated in response to industry cost of production data that shows labour as the number one expense for grower operations. The main objective of the program is to design automation technology for use in an indoor environment to enhance commercial success of the greenhouse sector.

## Summary of the Technology

Vineland Research and Innovation Centre (Vineland) has developed a proprietary, patent pending technology for gripping and simultaneous orienting of tulip and other flower bulbs with respect to the growing end. The technology allows the use of automation to place the bulbs in greenhouse growing containers.

Historically, the process of planting bulbs has been done manually with workers orienting and placing the bulbs into the growing containers. The containers used are typically rectangular crates or round pots containing a soil-type growing substrate, or a rectangular grid array for hydroponic applications. The technology developed by Vineland allows the bulbs to be gripped and the growing end oriented for planting, regardless of how the bulb is resting when it is picked up.

While Vineland has developed the gripping and orienting mechanism, a complete planting machine would integrate additional industry-standard automation technologies including:

- Machine-vision to identify bulbs' growing ends
- Electromechanical/pneumatic system(s) to support the gripping/orienting assembly and convey bulbs to the growing container
- Singulation of bulbs fed in bulk
- Conveyors

With Vineland's assistance and input, the manufacturing licensee would generate a complete machine design encompassing the above elements. A robotic solution is feasible, but the applicant should consider an approach that provides the needed degrees of movement while minimizing cost in order to provide good margins for partners and attractive payback for users. More technical information on the system is included in the "*Bulb Planting Automation, General Specifications*" document.

Vineland is currently seeking a commercialization partner(s) to license the technology, carry out activities required to generate a design for a complete machine, build and test a

machine and ultimately market and distribute the machines globally.

## Proposal guidelines and requirements

- Vineland is seeking a licensee and/or commercialization partner(s) to bring this technology to market globally. This is an open and competitive process.
- Proposals received after July 4<sup>th</sup> 2017 will not be considered.
- The proposal may include participation by one or more cooperating entities, but one organization must be the lead applicant.
- The proposal must contain the signature of a duly authorized officer or agent of the company submitting the proposal.
- The following activities are all required to successfully commercialize the complete bulb planting system:
  - Engineering
  - Sales & Marketing
  - Installation
  - Manufacturing
  - Distribution
  - Service & Maintenance
- Complete proposals addressing all of the above activities are welcome. However, Vineland recognizes that potential machine builders may not have their own sales channel into the horticultural market, or be affiliated with such sales channel partners. Likewise, it is understood that potential sales channels may not be affiliated with capable machine design/builders. If your organization has the capacity to manage only a subset of the required activities in this RFP, the proposal will be considered as part of a commercialization strategy where Vineland will separately award machine design/build and sales/marketing activities in order to facilitate a beneficial partnership. The end goal will be to ensure commercial success of the technology through sufficient capability in the important areas of manufacturing, support, domestic sales and international sales. Please indicate on the supplied response template which activities you are able to address.
- Manufacturing of the machine must take place in Ontario.
- Once a licensee partner(s) has been identified, Vineland will initiate contract negotiations to define the final terms of the agreement. If agreement on license terms cannot be reached between the parties within 45 days, Vineland may seek an alternate licensee arrangement.

## Technical Description of the Technology

A technical description of the technology and its elements is included as the attached "*Bulb Planting Automation, General Specifications*" document. The information disclosed is proprietary and patent pending.

If you wish to have access to further information, please contact Vineland to make such a request. Vineland has constructed a prototype of the gripping/orienting mechanism. Viewing of this prototype and further design details are available to interested applicants. Please contact Vineland to initiate an agreement and schedule a visit **prior to June 29<sup>th</sup>, 2017**.

If a decision is made by Vineland to release more information than is currently included in this package, the information will be sent to all potential applicants.

## Market Information

In 2015, more than 121 million greenhouse-grown tulips were produced in Canada as cut flowers. Over 95 million of these were produced in Ontario (CANSIM table 001-0049).

In greenhouse facilities using a soil-type substrate, the planting workflow is as follows:

- Growing containers are washed and sanitized in an automated washer
- Growing containers are filled with soil using automation
- Bulbs are placed by hand
- A layer of sand is applied over the bulbs using automation

While other aspects of the process utilize automation and little human labour, the planting of the bulbs stands out as a manual, labour intensive stage. An example facility using a soil substrate with annual production of 20 million stems (typical of a “large” Canadian facility) will utilize approximately 16 people to plant bulbs at approximately 2500 pieces per hour per person. This labour requirement may be filled by migrant workers. The planting season is dictated by availability of imported bulbs, and has a total duration of approximately 12 weeks. In this example facility, annual labour costs for the manual planting process are approximately \$120,000 CDN which could be saved through automation. In addition to direct and indirect labour cost savings, automating the planting process provides additional benefits such as consistent pace and quality.

The hydroponic process eliminates soil from the workflow, but the process of placing the bulbs in a grid array is still an equally labour-intensive manual one. The planting season at a hydroponic facility is extended in comparison to facilities using a soil-based substrate. The labour savings and efficiency benefits derived through automation in either soil or hydroponic facilities are equivalent.

Outside of Canada, other important markets for greenhouse-grown tulips exist, representing significant export potential for the planting technology. The USDA reports 167 million tulip stems sold in the USA in 2015. This figure does not represent the total market as it excludes seven important states (California, Florida, New Jersey, New York, North Carolina, Ohio and Pennsylvania) whose data was withheld. Annual production, for example, by Fresh Tulips USA™ in Virginia was 45 million stems as of 2011 (Washington Post, Feb 2011). As the world’s largest producer of tulips, the Netherlands in particular is a major potential market for automated bulb planting. Nearly 2 billion stems were produced in 2016 (CBS, Statistics Netherlands). Other countries notable for tulip production include Sweden, Denmark, Norway, Turkey and Finland.

Tulips are the most popular flower crop grown from bulbs, but other flower types grown from bulbs such as lilies, orchids and daffodils could also benefit from planting automation.

To date, the only other known attempts at bulb planting automation have employed delta robots, which have not provided a compelling solution or been broadly adopted. It is believed that an effective implementation of Vineland’s technology would provide a compact and high-speed solution at an attractive price. Upon generating a preliminary design, throughput estimates and costing of a complete machine, a better sense of economic impact can be gained through a payback analysis.

## Timeline

The following dates are estimated:

- Launch of RFP process: May 26<sup>th</sup>, 2017
- Viewing of prototype: May 30<sup>th</sup> – June 29<sup>th</sup>, 2017
- Close of RFP process: July 4<sup>th</sup>, 2017
- Selection of successful applicant: July 7<sup>th</sup>, 2017
- Detailed design and build and factory test of beta-test unit: July 14<sup>th</sup> – September

- 29<sup>th</sup>, 2017
- Display and Launch at CGC Show 2017: Oct 4<sup>th</sup> & 5<sup>th</sup>, 2017
- Installation and testing at commercial greenhouse: Oct 6<sup>th</sup> – Dec 22<sup>nd</sup>, 2017
- Commercial availability: Begins Jan 2018

## Budget

Budgets are not required for this RFP submission. Once the successful applicant is chosen, a work plan and an associated budget will be developed jointly by Vineland, the applicant and the collaborating partners as applicable. Recognizing the potential market opportunity, it is important to note that the licensee of this technology will be required to invest (via a combination of cash and in-kind contributions) in the technology in order to bring this technology to market. The level of investment will be negotiated and determined once the work plan is developed.

## Licensing Terms

Vineland's operational model requires that it generates commercialization revenue from the technologies and products that it develops. These revenues (in the form of royalties, up-front and milestone payments) will then be reinvested into Vineland's research and commercialization programs. For this proposal, applicants are asked to submit proposed licensing payment terms within their application. For clarity, this is the proposed revenue stream that will be directed to Vineland in return for the rights to commercialize the technology. The terms may include, but are not limited to, the following: up-front payments, milestone payments, royalty sharing, and covering the costs of intellectual property protection. These terms will be negotiated and finalized once a licensee(s) has been identified.

It is envisioned that a non-exclusive license for the gripping/orienting technology will be granted (to allow for potential use in other industries) along with an exclusive license to manufacture the complete bulb-planting machine, including future variations to address different options or throughput requirements. Sales & territory licensing arrangements will be determined based on the sales partner's capacity and proposed sales structure (i.e. direct sales vs. reps, global partners, etc).

## Evaluation criteria

- Ability to manage the activities required for the successful commercialization of the bulb planting technology, either directly or in partnership with other companies or organizations (the vision of how this will be achieved should be clearly explained in the submission)
- Knowledge and experience working in the horticultural industry and/or other relevant project experience
- Ability and willingness to invest (funds, time and resources) in building the beta unit and the testing phase of the project
- Technical ability, capacity and related prior experience to design and manufacture the bulb planting machine
- Manufacturing facilities capable of producing the technology in Ontario
- Financial, sales and marketing capacity and plan to successfully launch the bulb planting technology and continue successful sales over time to local and international customers in the horticultural industry
- Management, key personnel and skill sets
- Technical staff and resources for installations, repairs and customer support
- Anticipated return on Vineland's investment via the license agreement with the

- applicant
- Commercial track record
- References

## Template and submission information

The attached template should be completed by the applicant and submitted by **4pm EST, on July 4<sup>th</sup>, 2017**. Questions about the process or the template itself will not be accepted **after 4pm EST, on June 29<sup>th</sup>, 2017**. Questions and submissions should be directed to:

Vineland Research and Innovation Centre  
Attn: Darren Ward, Manager, Business Planning and Commercialization  
4890 Victoria Avenue North  
PO Box 4000  
Vineland Station, Ontario L0R 2E0  
Phone: 905.562.0320 x793  
Email: darren.ward@vinelandresearch.com

If you wish to have access to further information, please contact Vineland to make such a request. Vineland has constructed a prototype of the gripping/orienting mechanism. Viewing of this prototype and further design details are available to interested applicants at Vineland's discretion. Please contact Vineland to initiate an agreement and schedule a visit **prior to June 29<sup>th</sup>, 2017**.

If a decision is made by Vineland to release more information than is currently included in this package, the information will be sent to all potential applicants.

### **Disclaimer**

All information provided is accurate at the time the RFP is distributed but may be subject to change. Vineland does not guarantee the outcome of this process. Participation in the RFP does not guarantee that license(s) will be awarded. All expenses that proponents incur in responding to the RFP will be borne by proponents; Vineland will not reimburse any such costs.

Responses will be evaluated based on all relevant factors, as determined by Vineland. Vineland may request, from any responding party, additional information and/or clarification in regard to the submitted proposal. Vineland reserves the right to enter into negotiations subsequent to this RFP which may result in changes to any of the terms initially proposed in the RFP, including without limitation, the territory, exclusivity, royalty rates, etc. A license will not necessarily be awarded to the party or parties proposing the most favorable financial terms in response to this RFP. This RFP process does not guarantee the award of any license by Vineland. Any responses, materials, correspondence, or documents provided to Vineland will be kept confidential.

**Vineland Research and Innovation Centre**

4890 Victoria Avenue North, Box 4000  
Vineland Station, ON L0R 2E0

tel: 905.562.0320

[vinelandresearch.com](http://vinelandresearch.com)

15 June 2017

## RFP submission template – Flower Bulb Planting Automation

The following should be completed by the applicant and **submitted by 4pm EST, on July 4<sup>th</sup>, 2017**. The template below will expand to accommodate longer answers. Please provide complete answers to all questions.

Questions about the process or the template itself will not be accepted after **4pm EST, on June 29<sup>th</sup>, 2017**. Questions and submissions should be directed to:

Vineland Research and Innovation Centre  
Attn: Darren Ward, Manager, Business Planning and Commercialization  
4890 Victoria Avenue North, PO Box 4000  
Vineland Station, Ontario L0R 2E0  
Phone: 905.562.0320 x793  
Email: [darren.ward@vinelandresearch.com](mailto:darren.ward@vinelandresearch.com)

<b>Part 1: Applicant information</b>	
1. Company Name:	
2. Contact Name and Title:	
3. Address:	
4. Phone #:	
5. Email:	
6. Brief Company Description (include any relevant experience working with horticultural/greenhouse industry or other relevant project experience):	



<p>7. Roles the Company is intending to play in the commercialization of the bulb gripping/orienting technology (check all that apply):</p>	<input type="checkbox"/> Engineering <input type="checkbox"/> Manufacturing <input type="checkbox"/> Marketing <input type="checkbox"/> Sales <input type="checkbox"/> Distribution <input type="checkbox"/> Service and Maintenance <input type="checkbox"/> Other _____
<p>8. a) Vineland's expectation is that all of the activities listed in question 7 are required. Will you be working as a solo entity fulfilling all requirements or partnering with other organizations to complete all the activities required for commercialization?</p>	<input type="checkbox"/> Solo <input type="checkbox"/> Partnering
<p>b) If intending to partner (question 8a), provide name(s) and role(s) of each partner organization, and/or indicate where partner relationships will need to be facilitated:</p>	

<p><b>Part 2: Commercialization strategy</b></p>	
<p>9. Territory(ies) you would be interested in licensing for this technology:</p>	<input type="checkbox"/> All of Canada <input type="checkbox"/> Ontario <input type="checkbox"/> British Columbia <input type="checkbox"/> Quebec  <input type="checkbox"/> USA  <input type="checkbox"/> All of North America  <input type="checkbox"/> All of Europe <input type="checkbox"/> Netherlands <input type="checkbox"/> Other _____  <input type="checkbox"/> Other _____
<p>10. Briefly describe your vision for the bulb gripping/orienting</p>	



technology to ensure commercial success.	
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<b>Part 3: Capabilities and resources</b>	
11. Describe the capabilities of the applicant and/or the partner organizations to carry out the following (if applicable):	
Engineering:	
Manufacturing, and location of facilities:	
Marketing:	
Domestic Sales:	
International Sales:	
Distribution:	
Onsite installation, service & support (domestic and international):	
12. Financial Resources. The prototype and testing phases will require a reasonable level of investment to bring the product to successful launch. Please provide a description of activities expected and approximate required investments you anticipate making in each activity.	
13. Do you have the financial resources to support the activities listed in question #12?  If no, how do you anticipate funding the commercialization of the bulb gripping/orienting technology.	<input type="checkbox"/> Yes <input type="checkbox"/> No
14. Please <b>include the following additional documents</b> with your submission:	
a. Reference from your financial institution b. Certificate of liability insurance/proof of coverage c. Evidence of WSIB/WCB coverage (number and standing)	



15. Management and key personnel. Please list the key team members, a description of their skill sets and their role(s) in the commercialization of the bulb planting technology:

#### **Part 4: Proposed financial terms**

16. Briefly describe how you anticipate structuring the license arrangement with Vineland, specifically the financial terms (i.e. the revenue stream that will be directed to Vineland in return for the rights to commercialize the bulb gripping/orienting technology). Terms may include, but are not limited to: upfront payments, milestone payments, royalty (% and/or minimum annual royalties), cost recovery for intellectual property (patent costs), etc.

#### **Part 5: Machine concept**

17. Please provide a brief conceptual design and/or description of the design you are proposing. A detailed design is not required at this time, only a high-level basic concept. Attach as a separate file as needed.

#### **Part 6: Applicant comments and additional information**

18. If you have any additional comments that were not addressed in the rest of this document, please include them below. In addition, if you have other documents that you would like to submit, please describe them below and attach them to this file.

#### Revision History

Rev 0	May 26, 2017	Initial release
Rev 1	June 12, 2017	Dates extended



This proposal has been approved and submitted by an authorized representative of <INSERT COMPANY NAME HERE>.

Signed: \_\_\_\_\_

Printed: \_\_\_\_\_

Title: \_\_\_\_\_

Date: \_\_\_\_\_



Revision History

Rev 0      May 26, 2017  
Rev 1      June 12, 2017  
Rev 2      June 15, 2017

Initial release  
Dates extended  
Corrected submission date in "Proposal  
Guidelines and Requirements" section

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