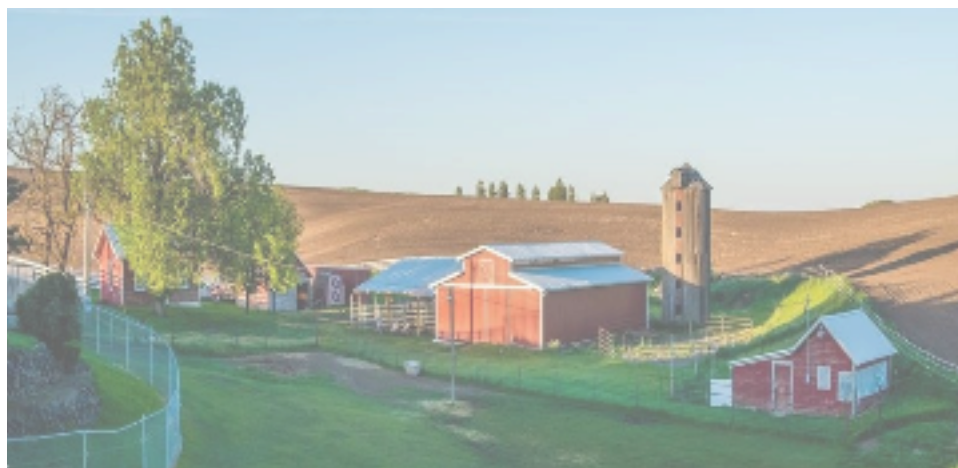


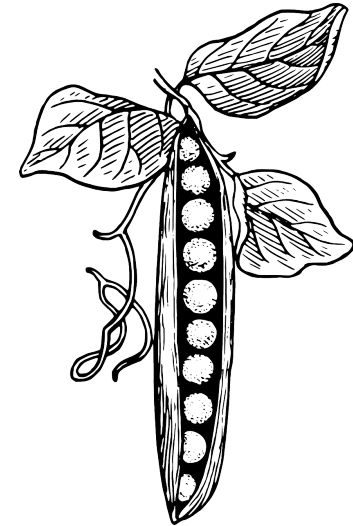


## **Yellow Pea Growing Blueprint**



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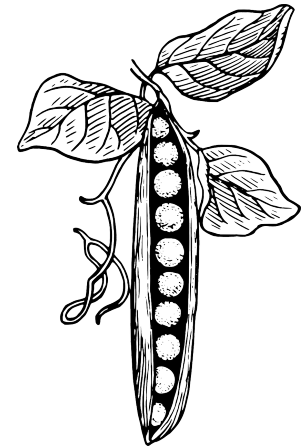
# Introduction: Why Yellow Peas? Why Shift Your Farm?

We believe that farmers hold the key to better food, a safer planet, and a sound future. By working with farms, the true source of our food, we have the opportunity to "farm our future."

We want to disrupt the food system for the better, while improving social welfare for farmers, ensuring animal welfare and contributing to a positive environmental impact for our future. Part of this shift is encouraging the production of yellow peas.

Peas are easy to grow. They are nitrogen fixers, making the soil more fertile this way. They make great rotation crops and companion plants. Although peas don't yield as much produce as wheat per acre, the price per bushel is usually higher and they don't need as much fertilizer to grow.

In 2017, the global pea protein market was [worth \\$32 million](#), and this figure is expected to rise to a \$176 million by 2025, especially because of the increase in plant-based diets. Though soy protein and gluten (wheat-protein) are often used in vegan diets and for plant-based meat substitutes, more and more people are looking for soy and gluten alternatives, mainly pea protein. Pea protein isolates are made up of about 80% protein, have a quite neutral taste, but still the same texture as soya, which is ideal for plant-based meats and dairy-free milk/yogurt/ice cream. The most famous pea protein. The the best-know pea protein-using firm is probably Beyond Meat, which makes the famous Beyond Burger. The company's stock market value reached a skyrocketting \$1.5bn this year.



# Yellow Peas 101: Where, When, How to Grow Peas

Note: Click on the subtitles in the left column or hyperlinks in the right column for more information on each topic.

<a href="#">Optimal climate</a>	<ul style="list-style-type: none"><li>• Moderate precipitation, not excessive</li><li>• Too wet causes root rot</li></ul>
<b>Optimal U.S. states</b>	<ul style="list-style-type: none"><li>• Top states: Washington, Idaho, Oregon, Montana, North Dakota, South Dakota</li></ul>
<b>Best types of soils to grow</b>	<ul style="list-style-type: none"><li>• Low in nitrogen- if too much nitrogen in the soil, bacteria will use that and not form a symbiotic relationship with the plant.</li><li>• Not too wet, so roots don't rot- roots are vital especially for pulses so that the rhizobia can live in the root nodules.</li></ul>
<a href="#">Best season/time of year for planting</a>	<ul style="list-style-type: none"><li>• End of March, first week of April, i.e. 4 to 6 weeks before <a href="#">last spring frost date</a>, when soil temperatures reach at least 45°F (7°C), but beware of excessive moisture caused by snowmelt or spring rain because seeds should not sit in wet soil.</li><li>• Peas can tolerate much colder conditions than e.g. corn or soy.</li><li>• Benefit of being able to plant in the colder season: you can start planting earlier in the year</li></ul>

<p><b>Best time of the year for harvesting</b></p>	<ul style="list-style-type: none"> <li>• Usually, August after the legumes have dried on the vines</li> </ul>
<p><u><a href="#">Best agricultural practices</a></u></p>	<ul style="list-style-type: none"> <li>• Make sure <a href="#">the correct pea strain</a> is selected and inoculated with the right rhizobium at seeding time.</li> <li>• Water sparsely unless the plants are wilting and don't let plants dry out, or no pods will be produced.</li> <li>• Be careful when removing weeds to not disturb fragile roots.</li> <li>• It's best to rotate peas every 1 to 2 years to avoid a buildup of soil-borne diseases. In between pea plantings, plant other grains other vegetables to take advantage of the nitrogen-rich soil.</li> </ul>
<p><u><a href="#">Best crops to rotate with peas</a></u></p>	<ul style="list-style-type: none"> <li>• Best to rotate pulses with cereals, like winter wheat or spring barley that are less likely to carry pulse diseases, while pulses disrupt the disease cycle of cereals, increase nitrogen in soil &amp; soil moisture and reduce erosion.</li> <li>• Or, rotate with grass/maize as it accumulates much organic matter. Legumes should not be grown more than once, or twice at most on the same land without other crops being grown in rotation.</li> <li>• Ideally, 4-year crop rotations: peas, wheat or barley or oat, oilseeds like canola or flax or mustard, peas.</li> </ul>

	<ul style="list-style-type: none"> <li>• In corn-soy-pea rotations, peas improve the water holding capacity and yield of corn and soy in the following years.</li> </ul>
<b>Suggested companion plants</b>	<ul style="list-style-type: none"> <li>• Beans</li> <li>• Carrots</li> <li>• Corn</li> <li>• Cucumbers</li> <li>• Early potatoes</li> <li>• Radishes</li> <li>• Turnips</li> <li>• Brussels sprouts</li> <li>• Cabbage</li> <li>• Cauliflower</li> <li>• Celery</li> <li>• Lettuce</li> <li>• Squash</li> <li>• Sage</li> </ul>
<b>Avoid planting next to</b>	<ul style="list-style-type: none"> <li>• Alliums (Chives, Garlic, Onion, Shallots)</li> </ul>

<p><b>Fertilizer and/or other soil additives required for optimal growth</b></p>	<ul style="list-style-type: none"> <li>● Add phosphorus (especially important for roots) in the year when cereals or oilseeds are grown, so pulses can use it when they are planted a year afterward.</li> <li>● If adding fertilizer when planting peas, use 100-150 pounds of monoammonium phosphate (MAP) per acre, and add gypsum to get calcium and sulfur into fertilizer mix.</li> <li>● Inoculants encourage the formation of high-nitrogen nodules on plant roots for richer soil, bigger plants, and better yields. Prior to planting, moisten seed in a planter box at a rate of approx. 3.5 oz. of clean, non-chlorinated water per 100 lb. of seed. Add inoculant and mix thoroughly.</li> </ul>
<p><b>Disease, pest and weed control</b></p>	<ul style="list-style-type: none"> <li>● Crop rotations helps to control weeds, discourages diseases, protect soil from erosion, reduce insect populations, and rejuvenate soil organic matter - a valuable source of nitrogen.</li> <li>● Tansy discourages cutworm.</li> <li>● If herbicide needed, Spartan Charge recommended, but ideally, high seeding rate and thick stand will be enough to fight weeds.</li> </ul>
<p><u><a href="#">Expected yield</a></u></p>	<ul style="list-style-type: none"> <li>● 1500 to 3000 pounds per acre</li> </ul>
<p><u><a href="#">How to store hemp</a></u></p>	<ul style="list-style-type: none"> <li>● At 16 percent moisture or lower and at temperatures below 15 C.</li> <li>● Aeration fans to reduce moisture and temperature levels.</li> </ul>

- |  |   |
|--|---|
|  | <ul style="list-style-type: none"><li>• If heat drying, air temperatures should not be over 45 C to preserve germination and don't dry more than four to five percentage points per pass through the dryer.</li></ul> |
|--|---|

## Organic Pea Farming

- Select spaces that are free from perennial weeds, and low in nitrogen- if too much nitrogen in the soil, the rhizobia will use that and not form a symbiotic relationship with the plant.
- Apply [biofertilizers and organic matter](#) to increase the yield of peas.
- Weeds reduced by
  - mulching
  - pre-emergence mechanical weed control at pre-emergence
  - harrowing in the early growth stages
  - a single pass of tine weeding either at pre-emergence or at the 2-leaf stage of the crop
  - on some occasions, two passes of the tine to control new weed emergence.
- Pea varieties that grow fast and accumulate biomass compete better with weeds.
- Increase yields with foliar application of effective microorganisms, seed inoculation with Rhizobium, organic matter.

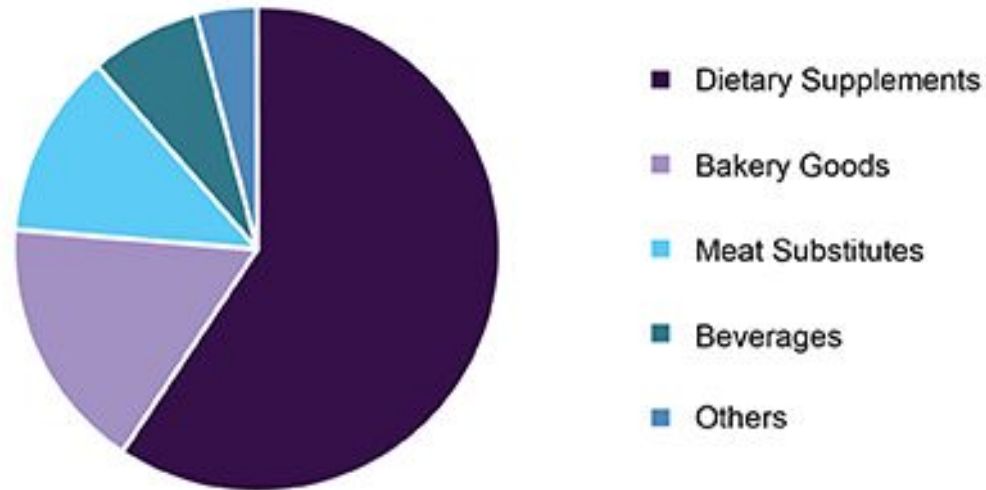


- Application of organic matter reduces wilt.
- Organic peas are [sun-dried without the aid of fungicides and pesticides](#). Once dried, collect them with harvesters and mechanically sift in a seed-cleaning machine where the weeds and chaff are separated.

## Uses of Pea

- Pea protein
- Pea starch for pet food, but also for vermicelli noodles especially in China
- Baked goods, especially for the Western European market)
- Clothing with fibers
- Bioethanol
- Bioplastic products - a field still to be explored, but with a lot more potential

## Global pea protein market share, by application, 2018 (%)



Source: [www.grandviewresearch.com](http://www.grandviewresearch.com)

### Potential Use of Pea Byproducts

- Disposable plastic and wrapping plastic- Canada did some studies on how to extract the cellulose to use for these products.

# Market Potential of Peas

There are currently about 15 processing facilities in North America, and there will probably be about 25 within the next 2 to 3 years. Beyond Meat has 60% of the total yellow pea protein demand in the U.S. currently, but other big pea protein (and starch) users are Alpha Foods, Rockette, ADM, Cargill- these last three will often do the processing from pea to protein isolate/starch.

More and more low-cost pea protein is coming from China and India, so the U.S., Canada, and the EU will have to look into making more premium products with peas as blends, grow peas with certain traits or make products with specific functionalities, all to create and sell higher-value products.

A very complete list of pulse suppliers can be found on [USA Pulses](#).

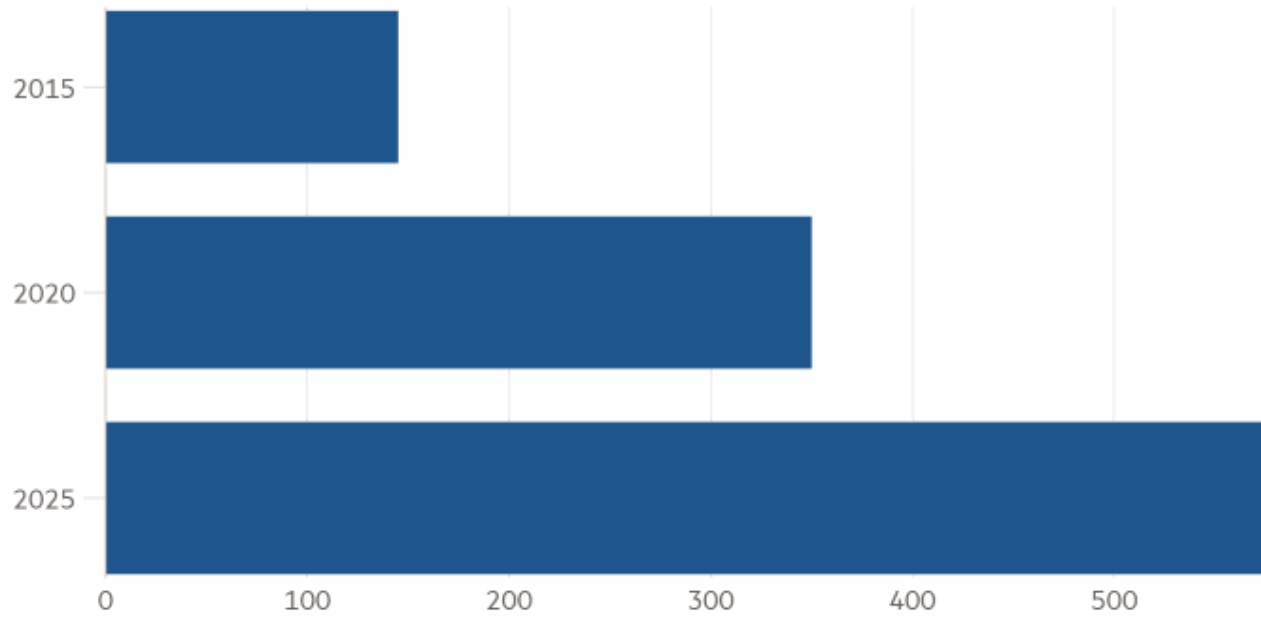
Well-know pea protein-producing companies at the moment are:

- Puris
- Roquette
- ADM
- Ingredion
- Cargill
- Cosucra

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## High growth forecast for pea protein market

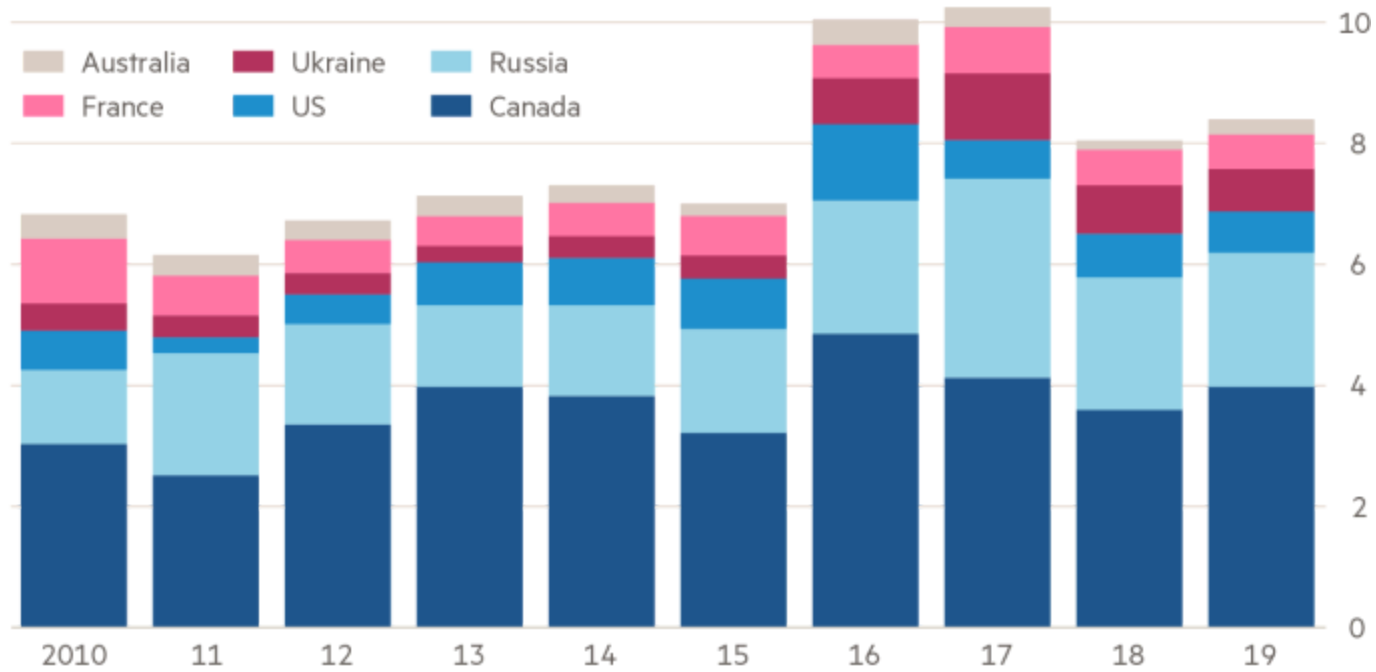
'000 tonnes



2020, 2025 are forecasts  
Source: Henk Hoogenkamp  
© FT

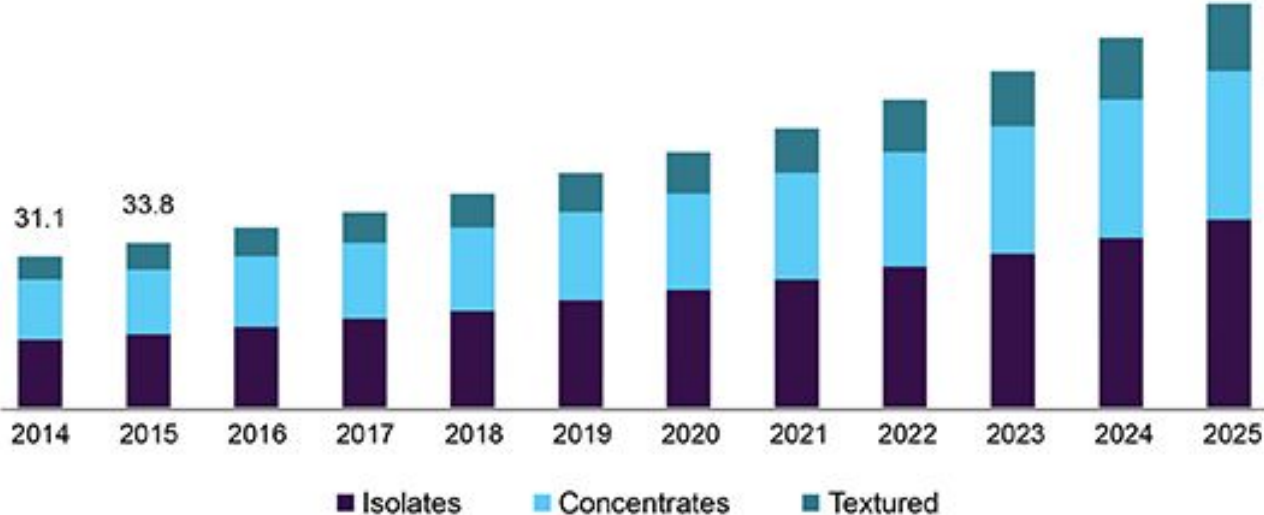
## Pea production by leading exporters

M tonnes



Source: LeftField Commodity Research  
© FT

U.S. pea protein market revenue by product, 2014 - 2025 (USD Million)



Source: [www.grandviewresearch.com](http://www.grandviewresearch.com)

# Financial Modelling and Financial Support for Pea Farming

## YELLOW FIELD PEA INPUT COSTS

Inputs	Cost/Acre
Seed	\$45
Herbicide	\$30
Fertilizer	\$75
Drilling	\$20
Harvest	\$20
Trucking	\$0.20/bu or \$12
<b>Total input cost/acre</b>	<b>\$202</b>

Source: [Emergence by FBN](#)

## Pea Farming Experts and Supportive Farm Affiliates

1. [Pulse Canada](#)
2. [Saskatchewan Pulse Growers](#)
3. [Timeless Natural Food](#)
4. [USA Pulse](#) - suppliers list
5. [Northern Pulse Growers Association](#)
6. [Strahinja Stepanovic](#) - University of Nebraska, Lincoln
7. [IndigoAg](#) - paying farmers for sequestering carbon, e.g. through peas

## Relevant Books and Articles

- [FAO 10-year research strategy](#) for pulse crops
- [Field pea production guide](#) from North Dakota State University

