

Economics of GM vs. Non-GM Rapeseed - Shifts in Direct Input Costs; Effects on Profitability

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Commercial Partners



Agenda

1. Development of GM vs. Non-GM Rapeseed
2. *agri benchmark* – concept & data
3. Shifts in Direct Input Costs
4. Effect on Overall Profitability
5. Conclusions and Outlook

Why Genetically Modified/Herbicide Resistant Rapeseed?

1. Easier and improved weed control => less competition from weeds
2. Convenience in herbicide application (timing) to cope with ever increasing farm sizes
3. Helps zero-till practices because soil incorporated pre-emerge herbicides were substituted by in-crop applications
4. Decreased use of herbicides => lower impact on environment
5. Higher yields through improved genetics (breeding is focussed on rapeseed with GM traits)

=> Claim: Higher net returns

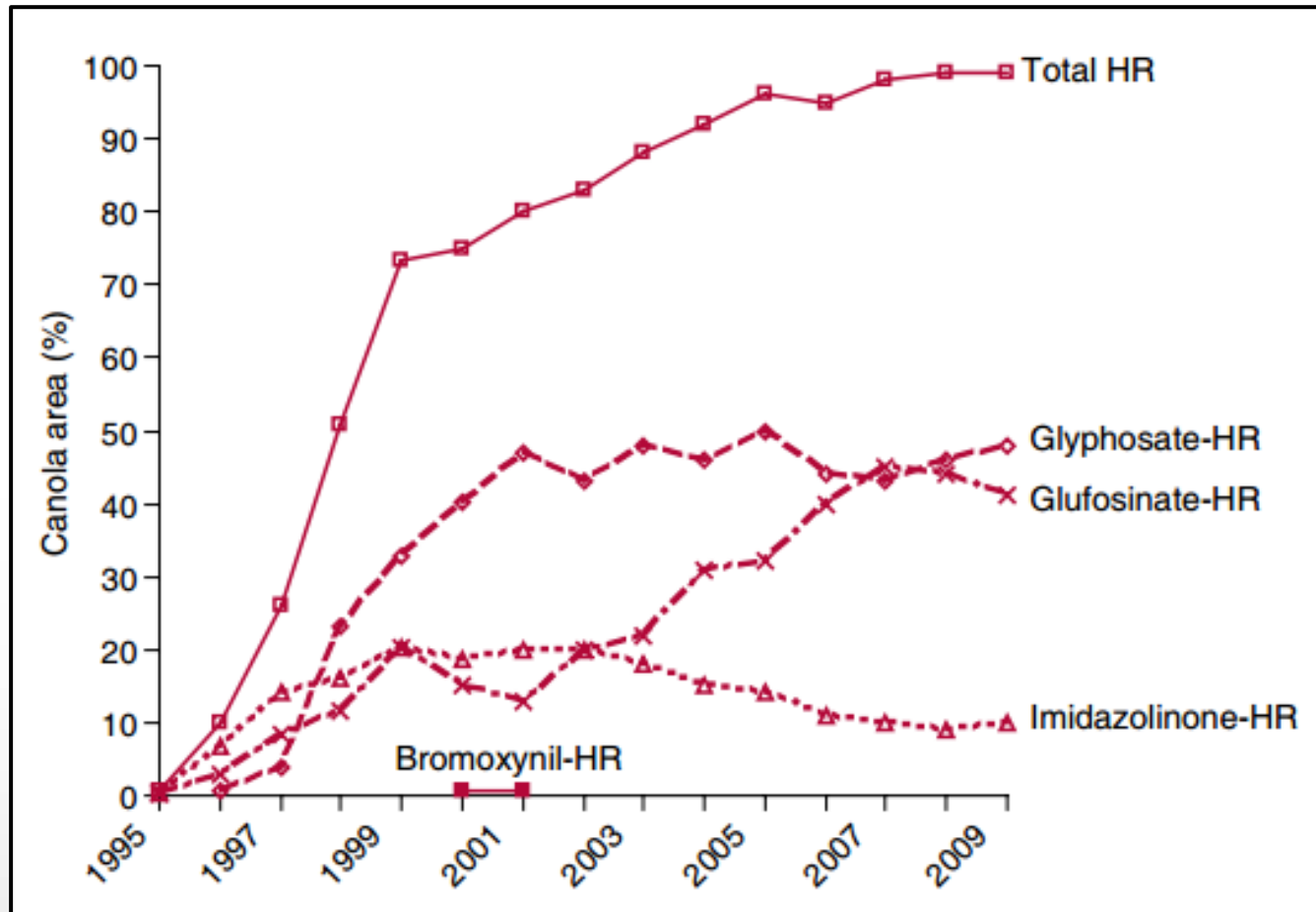
Source: H.J. Beckie, 2011, Statistics Canada, Canola Council of Canada, own research

GM Rapeseed in Canada

- 1. GM Rapeseed introduced in 1995**
- 2. Main Traits:**
 - Liberty Link - Glufosinate resistant
 - Round-Up Ready - Glyphosate resistant
- 3. As of 2015: out of 8.1 million ha of canola 95% is genetically modified (GM)**
- 4. Note: It is pretty hard to find good statistics, that have specific data on GM and non-GM Canola (usually GM crops in general)**

Source: H.J. Beckie, 2011, Clive James, 2014, Canola Council of Canada, own research

Adoption of GM Rapeseed in Canada

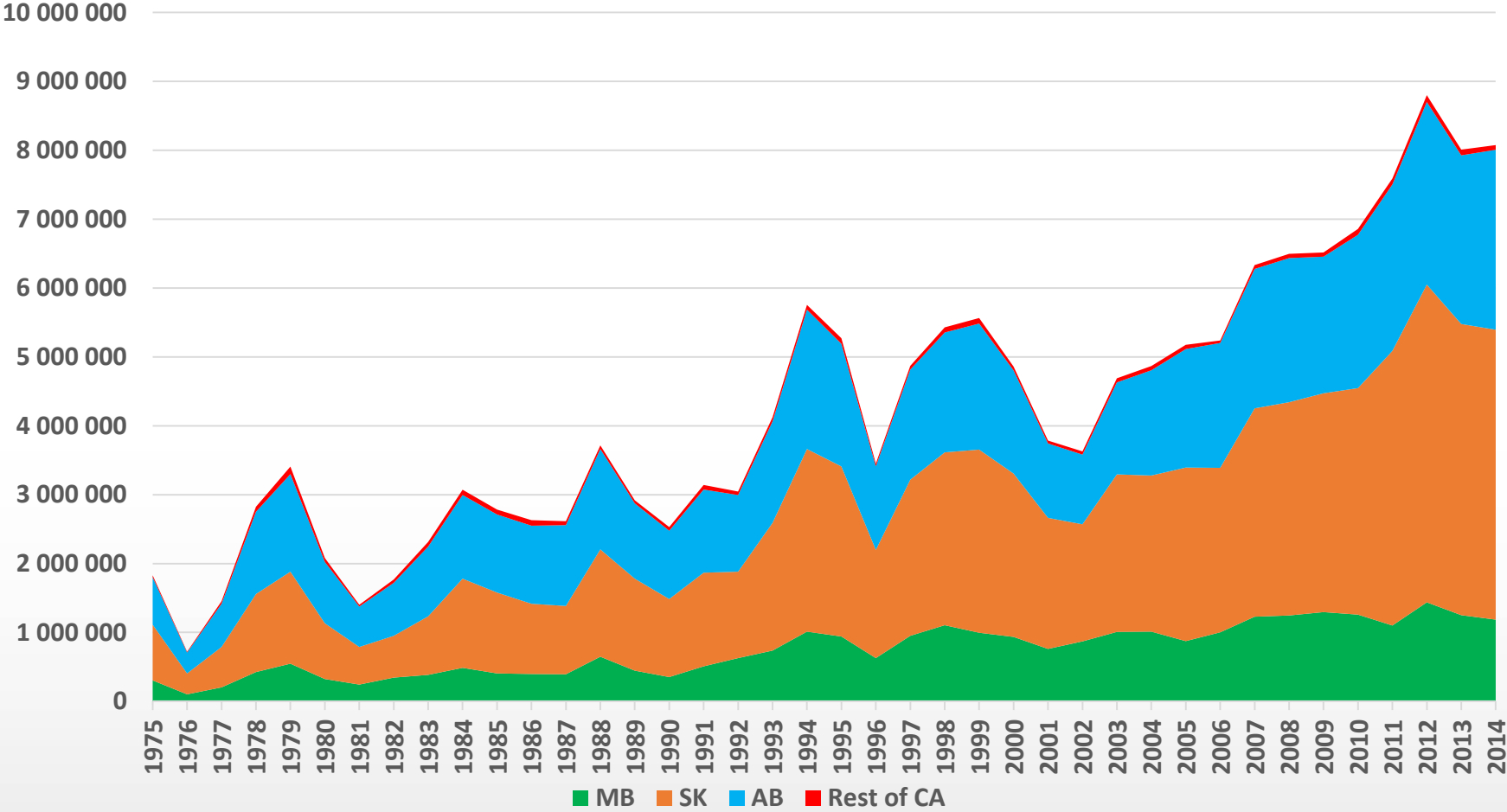


Source: H.J. Beckie, 2011

Rapeseed growing areas in Canada

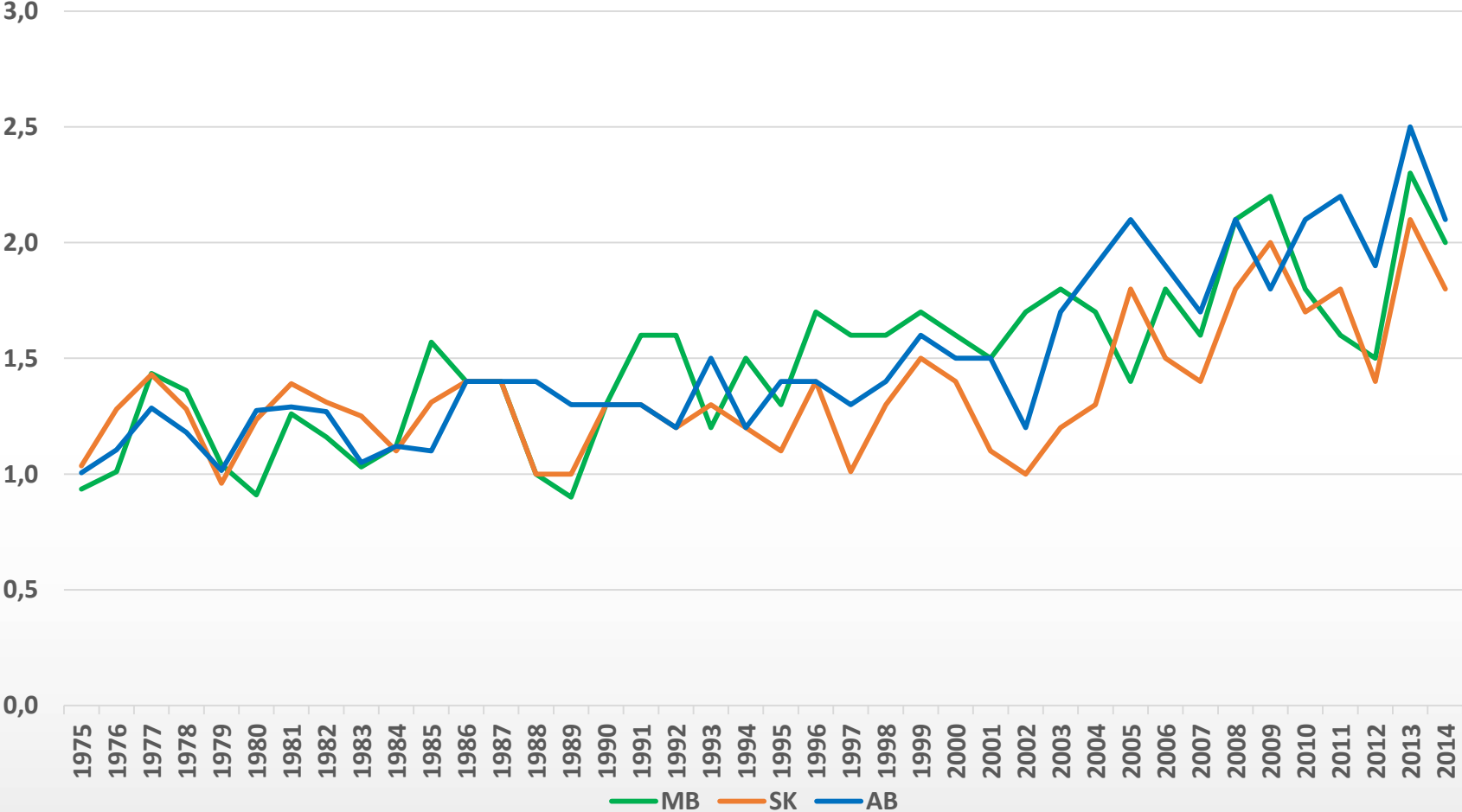


Development of Rapeseed Acreage (ha)



Source: StatCan

Development of Canadian Canola Yields (t/ha)



Source: StatCan

GM Rapeseed in Australia

- 1. Commercial release approved in 2003 by federal govt.**
- 2. All rapeseed-growing states put a moratorium on release, which has been allowed to expire a few years after**
- 3. Commercial GM rapeseed in**
 - Victoria and New South Wales since 2008**
 - Western Australia since 2009**
- 4. Main Trait:**
 - Round-Up Ready - Glyphosate resistant**

Source: Agriculture Victoria, Agricultural Biotechnology Council of Australia, Clive James, 2014.

GM & Non-GM rapeseed in Australia (2009 to 2014)

	2009	2010	2011	2012	2013	2014
NSW	13,930	23,286	28,530	40,324	21,573	5,200
VIC	31,186	39,405	2,272	19,012	21,232	37,000
WA		86,006	94,800	121,694	167,596	260,000
AU GM	47,125	150,707	147,613	183,042	222,414	349,000
AU CANOLA	1,165,000	1,390,000	1,590,500	1,815,000	2,480,000	2,480,000
%GM	4%	11%	9%	10%	9%	14%

1. Steep increase in overall rapeseed acreage
2. Steep increase in GM acreage
3. Moderate increase in share of GM in total acreage

Source: Australian Oilseeds Federation and Monsanto Australia

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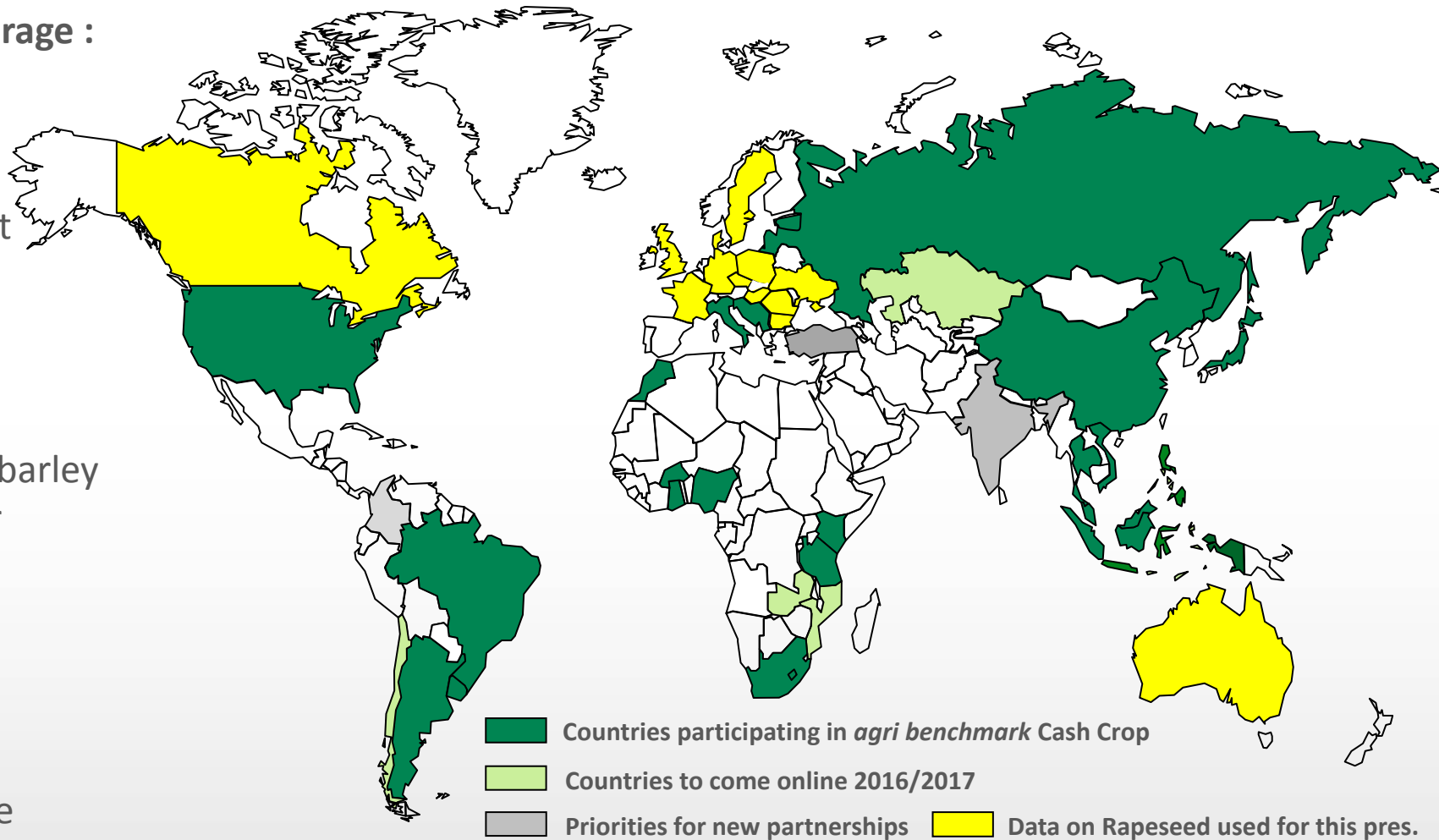
agri benchmark: Who we are and what we do

- 1. *agri benchmark* is a global, non-profit network of agricultural economists, advisors, producers and specialists in key sectors of the value chains.**
- 2. We use internationally standardized methods to analyze farms, production systems and their profitability.**
- 3. We combine our farm-level knowledge with our expertise in international commodity markets and value chains.**
- 4. Thereby we are able to provide scientifically consistent and soundly based answers on strategic issues to decision makers in agribusiness, policy and farming.**

Present in all major countries and crops

Crop coverage :

Corn
 Soybeans
 Wheat
 Sugar beet
 Rice
 Rapeseed
 Oats
 Rye
 (Malting) barley
 Sunflower
 Sorghum
 Cotton
 Peas
 Beans
 Palm oil
 Sugar cane



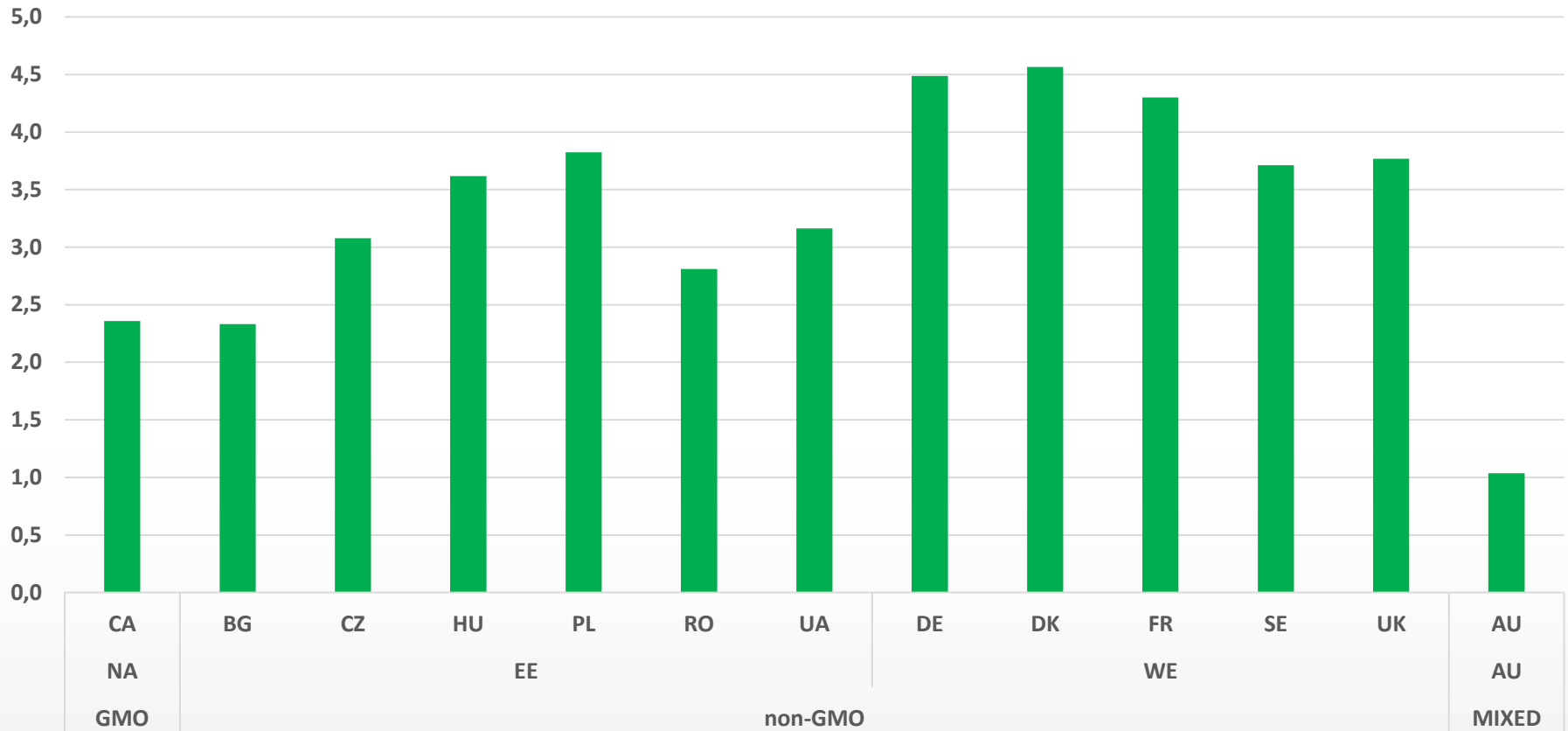
agri benchmark Farms - Established Systematically

A typical farm...

- ⇒ represents the origin of a major share of the national output in a given crop
- ⇒ is defined by a certain production system and a combination (if any) of enterprises
- ⇒ has certain structural features re. ownership of land as well as labor organization (family vs. hired)
- ⇒ annually updated and regularly re-assessed to track changes

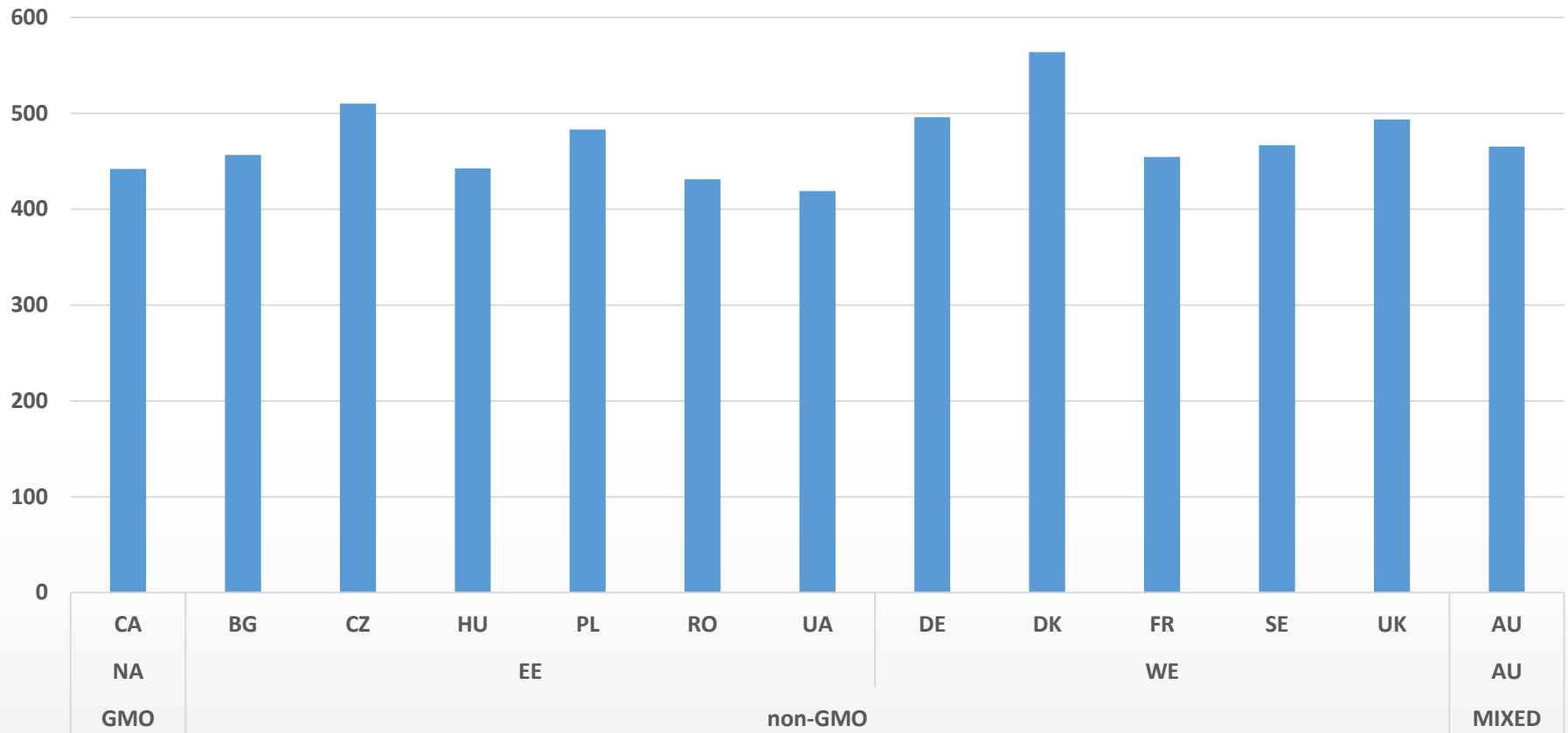
Data is jointly gathered by national partners, regional advisors and growers. Basis: Standard operating procedure (SOP).

Typical Farms: Average Rapeseed Yields (t/ha, 2012-2015)



1. Europe: Moderate climate zones have the best yield (mainly Winter Rapeseed)
2. Canadian yields similar to Eastern Europe
3. Australian yield levels low due to low precipitation & draught

Rapeseed Farm Gate Prices (USD/t, 2012-2015)

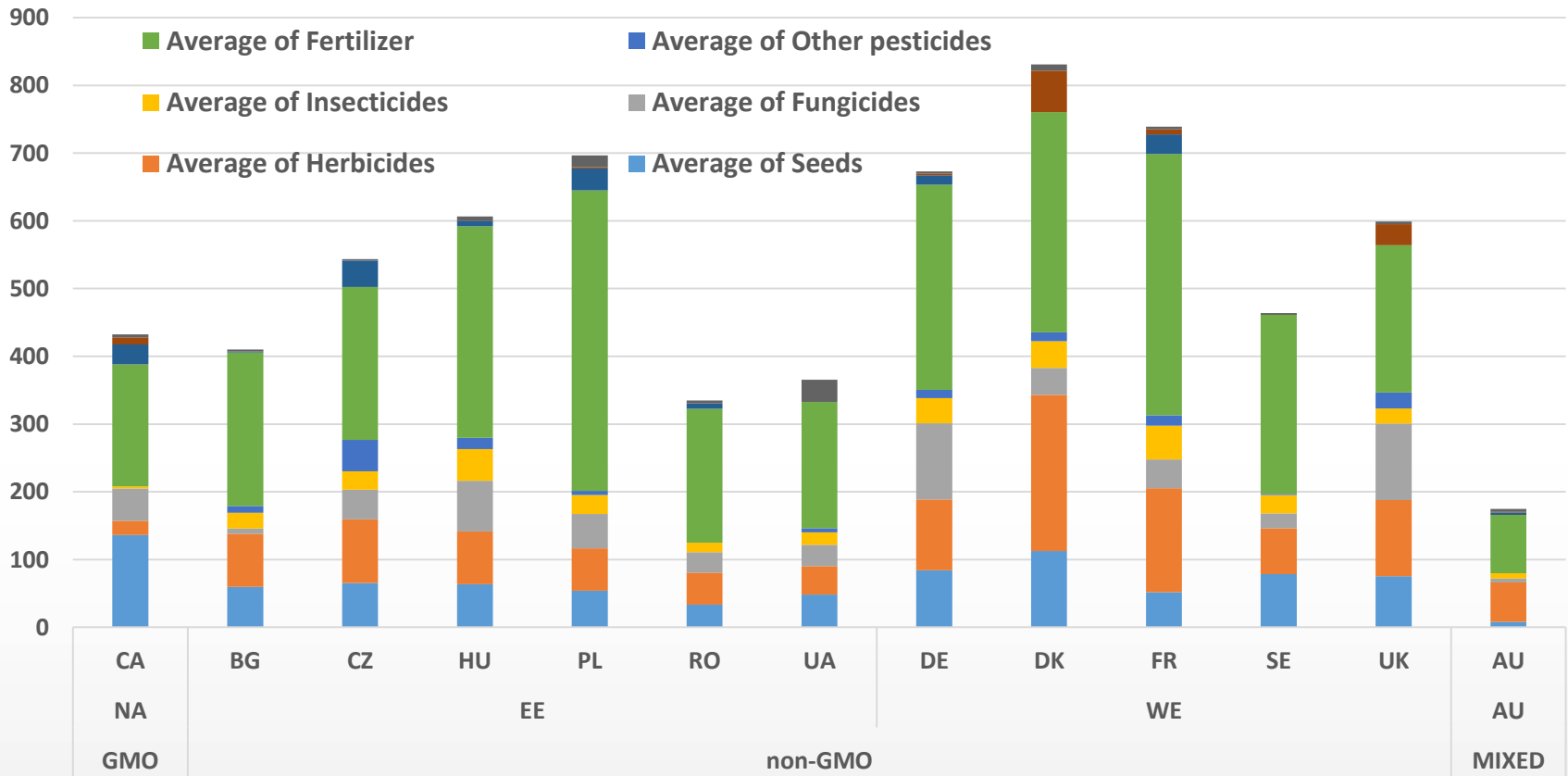


1. Canadian prices lower than rest of Western world - further away from the markets & GMO discount?
2. Discount for UA producers in line with other products (e.g. wheat)

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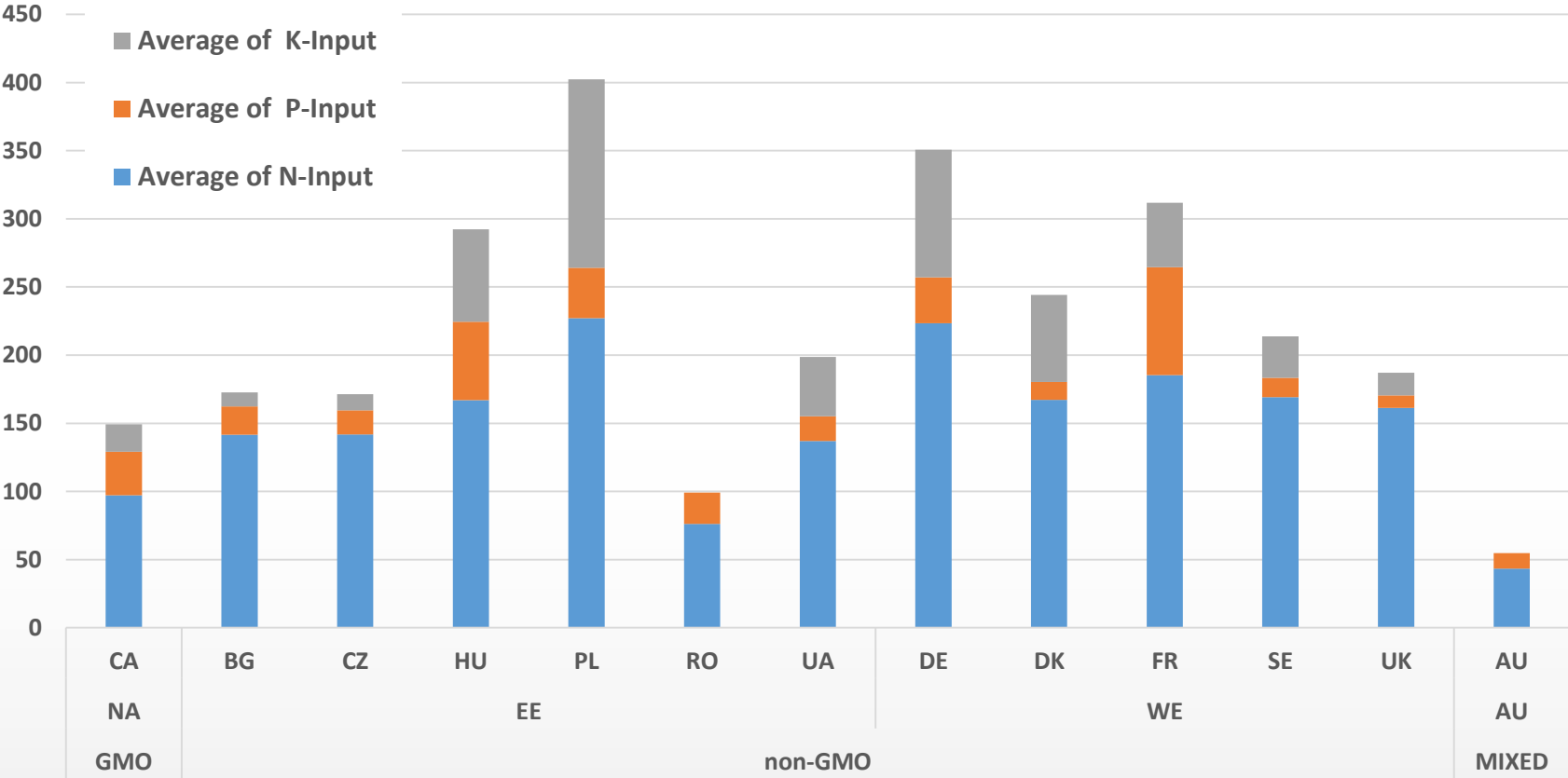
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Average Direct Cost (USD/ha, 2012-2015)



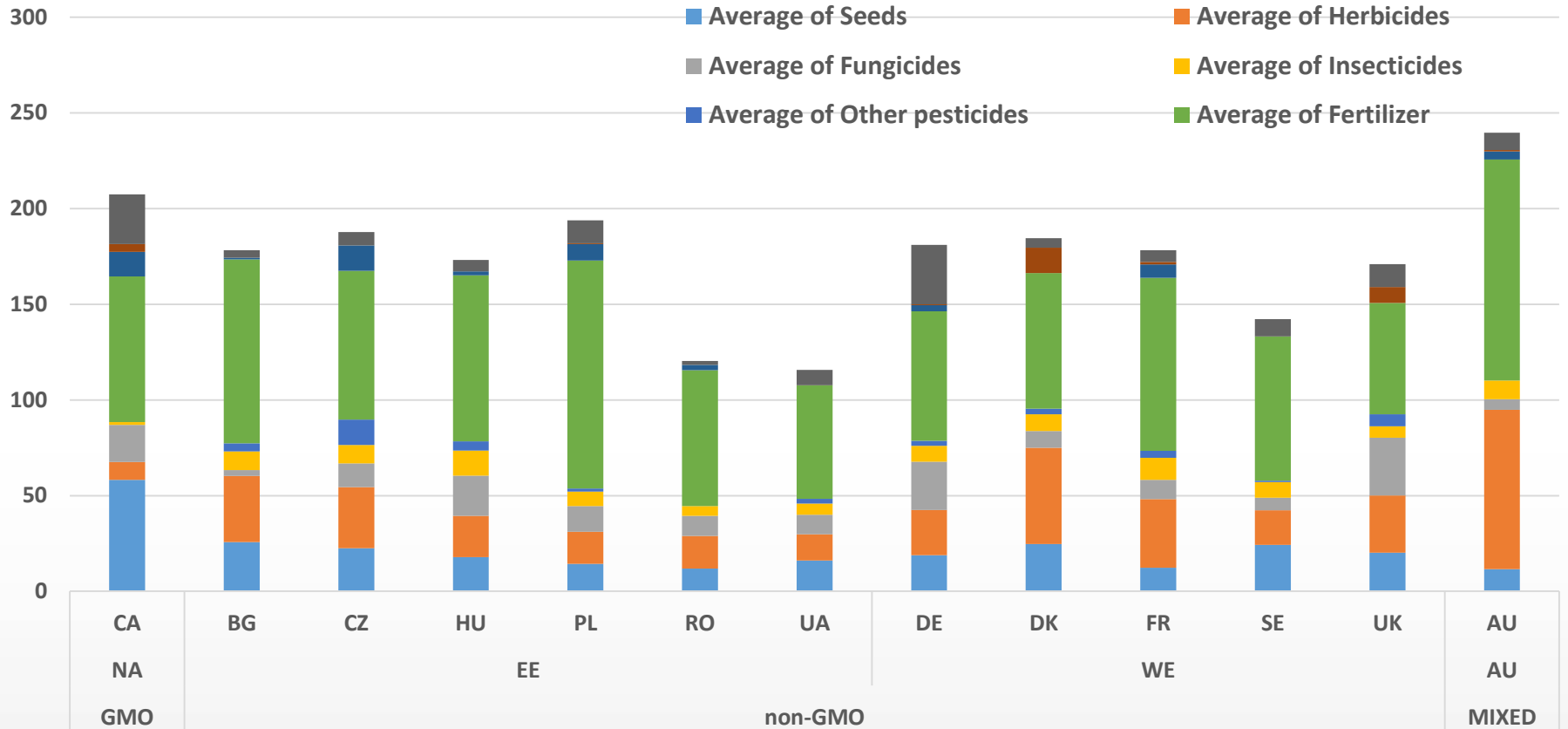
1. The more temperate the climate, the higher input cost per ha
2. Fertilizers by far the highest share in total direct cost
3. Except for CA: seed cost only of minor importance to growers

Average Fertilizer Input (kg/ha, 2012-2015)



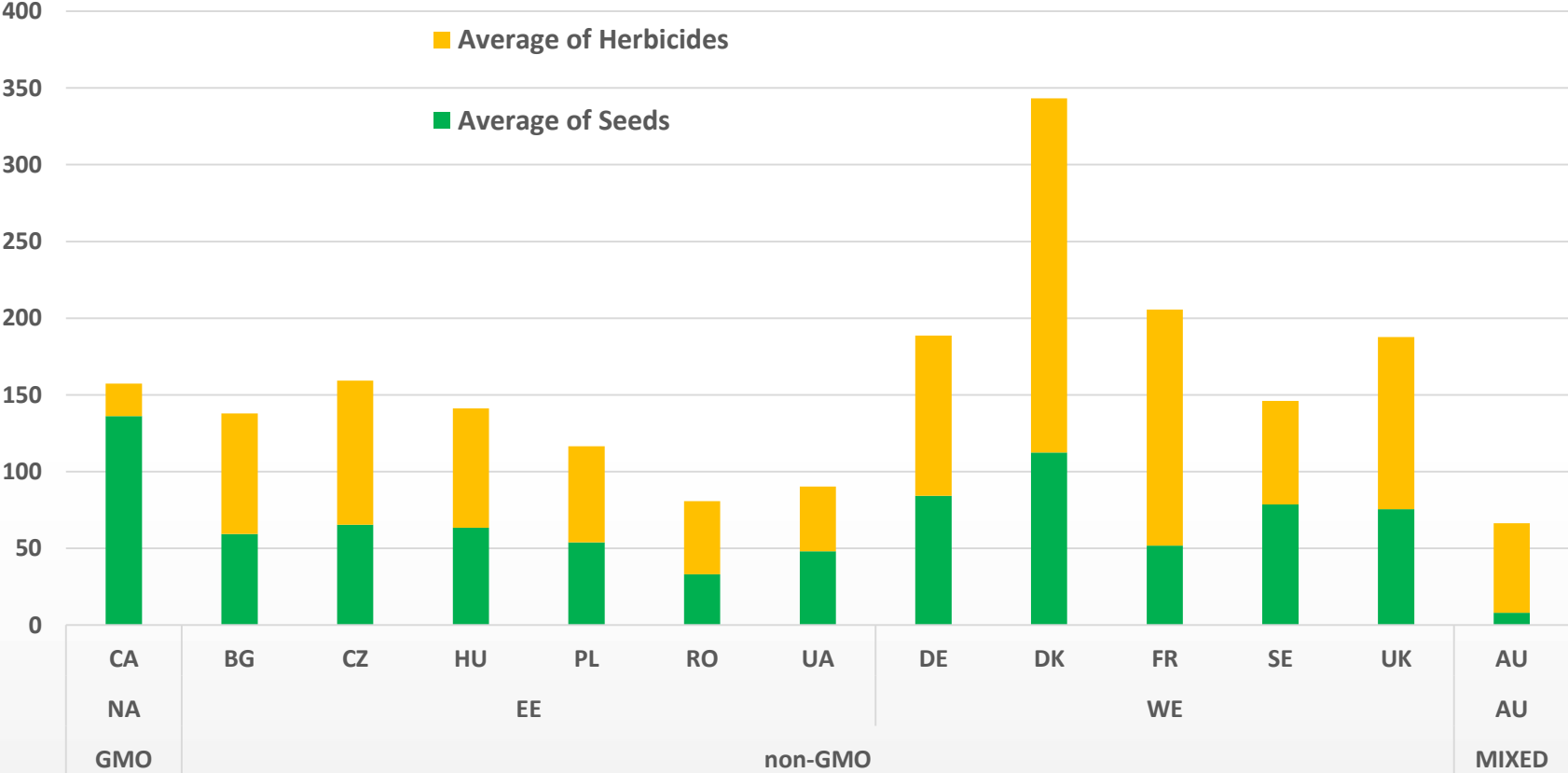
- 1. Low intensity in AU, RO, UA and CA (100 kg N/ha or less)
- 2. RoW: 150 – 200 kg N/ha

Average Direct Cost (USD/t, 2012-2015)



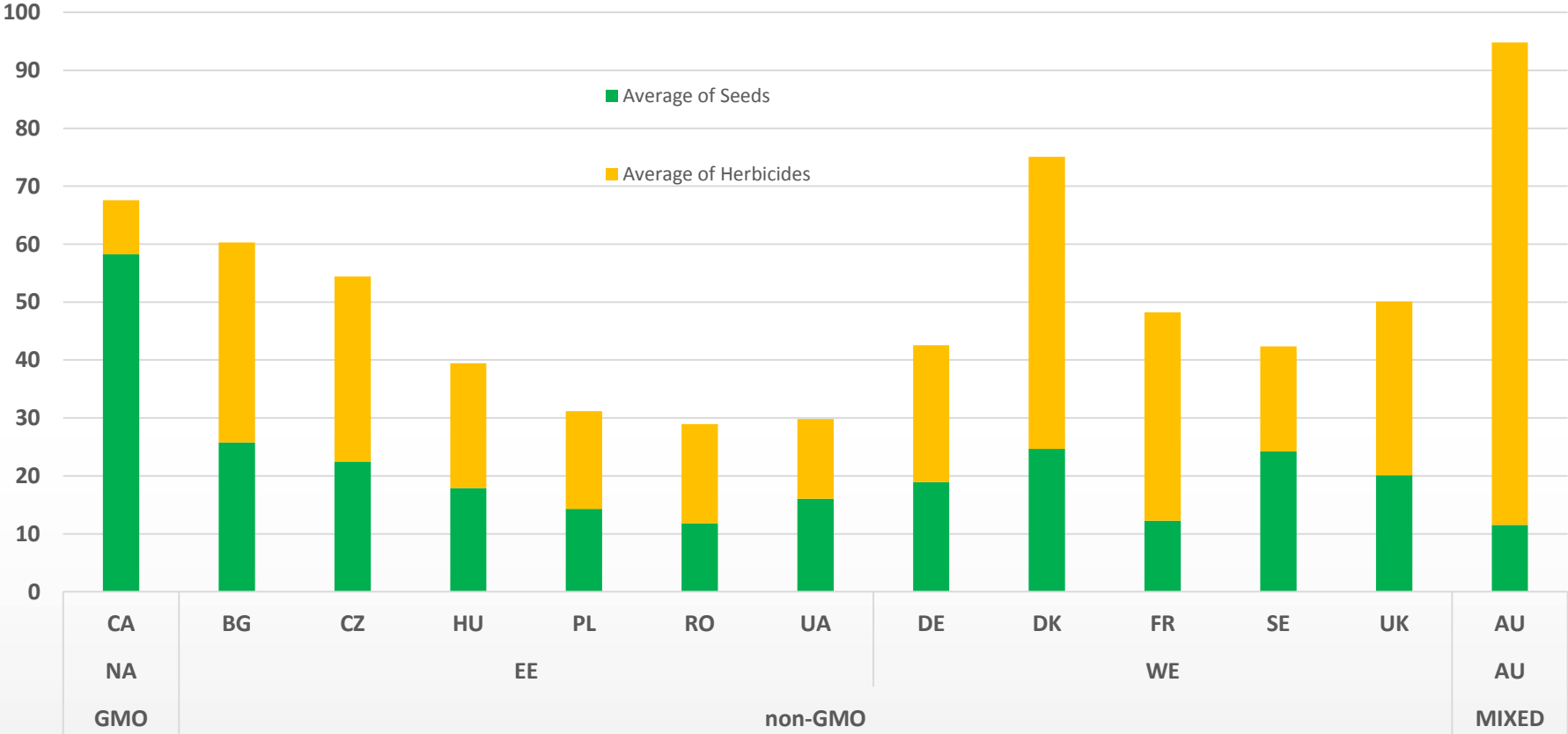
1. The picture is more even on a USD/t basis
2. But: CA-growers tend to be more expensive (30 \$/t)
3. Black Sea producers are the lowest in direct costs per ton

Seed and Herbicide Cost (USD/ha, 2012-2015)



1. Seed to Herbicide ratio is 6.5:1 in GM-rapeseed (CA) vs. about 1:1 in non-GM rapeseed
2. High seed cost for CA producers widely compensated through low herbicide cost
3. Relatively low seed and chemical prices in PL, RO, UA (farm saved seed & generic chemicals)

Seed and Herbicide Cost (USD/t, 2012-2015)

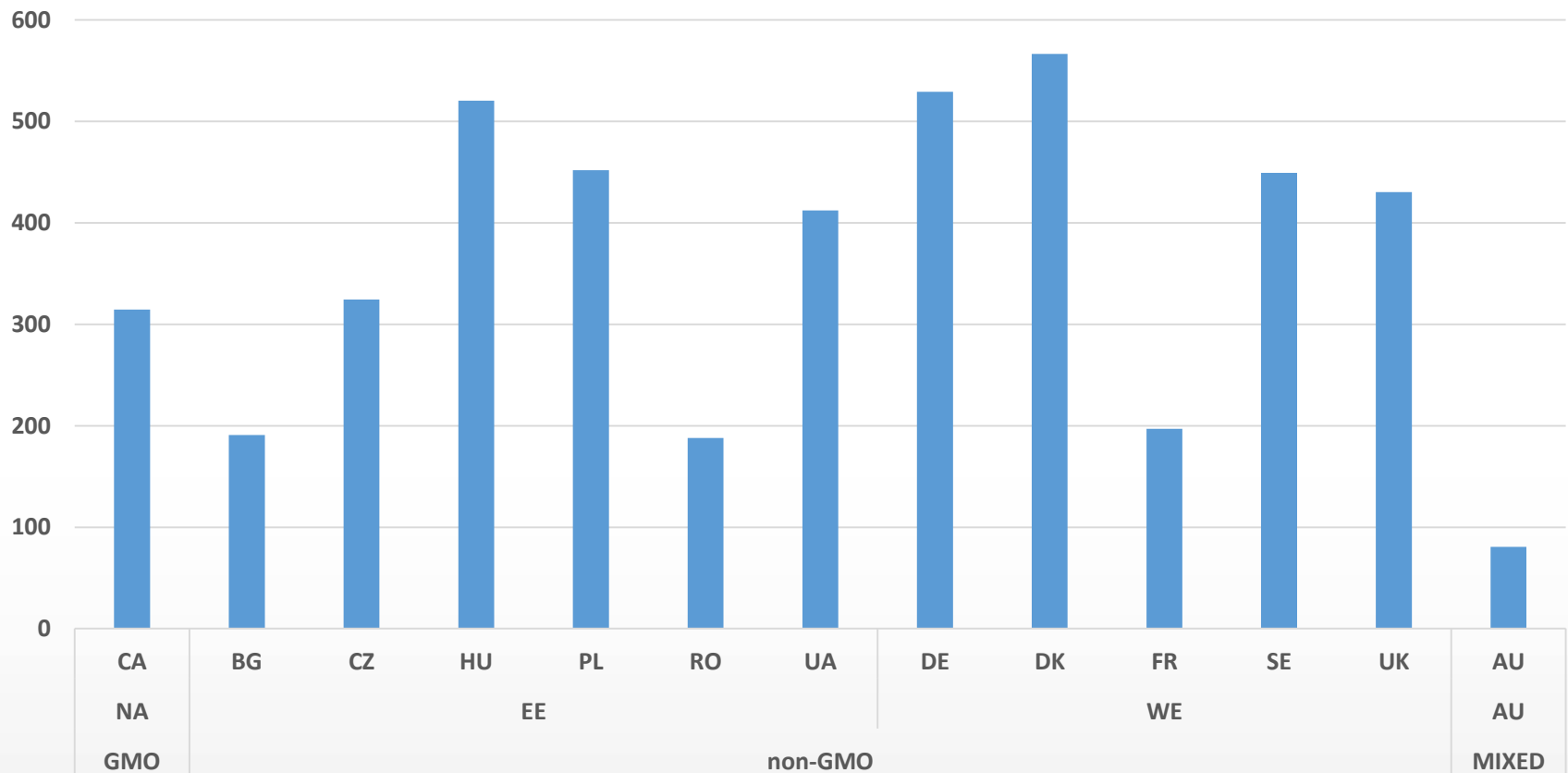


1. CA farms tend to be higher in direct cost per tonne – mainly due to high seed cost

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Rapeseed: Return to Land (USD/ha, 2012-2015)



1. CA farms despite rather low yields (and high seed cost) rather profitable

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Conclusions (1)

- 1. Caveat: For Canada straight effect of GM cannot be isolated since their occurrence coincided with the introduction hybrid seeds**
- 2. Higher costs for GM seeds tend be compensated with lower herbicide costs (CA farms per ha)**
- 3. But: per tonne seed and herbicide cost tend to be higher for CA growers compared to their global peers (10 to 20 \$/t)**
- 4. But: also in other crops (e.g wheat), direct cost per tonne tend to be higher for CA producers than on high yielding sites.**

Conclusions (2)

5. No indication that GM seed costs have a negative effect on overall profitability
6. Hypothesis: GMOs are used as risk management tool, that allows for higher share of rapeseed in the rotations.
Implication: Economic analysis needs to look beyond the individual hectare/acre.


Further Research

- 1. Australia, with low GM shares optimal region for more systematic economic analysis of GM vs. non-GM technology in rapeseed**
- 2. Hypothesis, that GMOs allow for a higher overall share of rapeseed in rotations (easier weed management) could be tested in Australia.**
- 3. *agri benchmark* about to expand into all AU rapeseed producing regions**
- 4. There is indication that GM rapeseed is traded at a discount (at least in AU). This should be evaluated further.**

Knowledge is our business

Thank you for your interest in *agri benchmark*.



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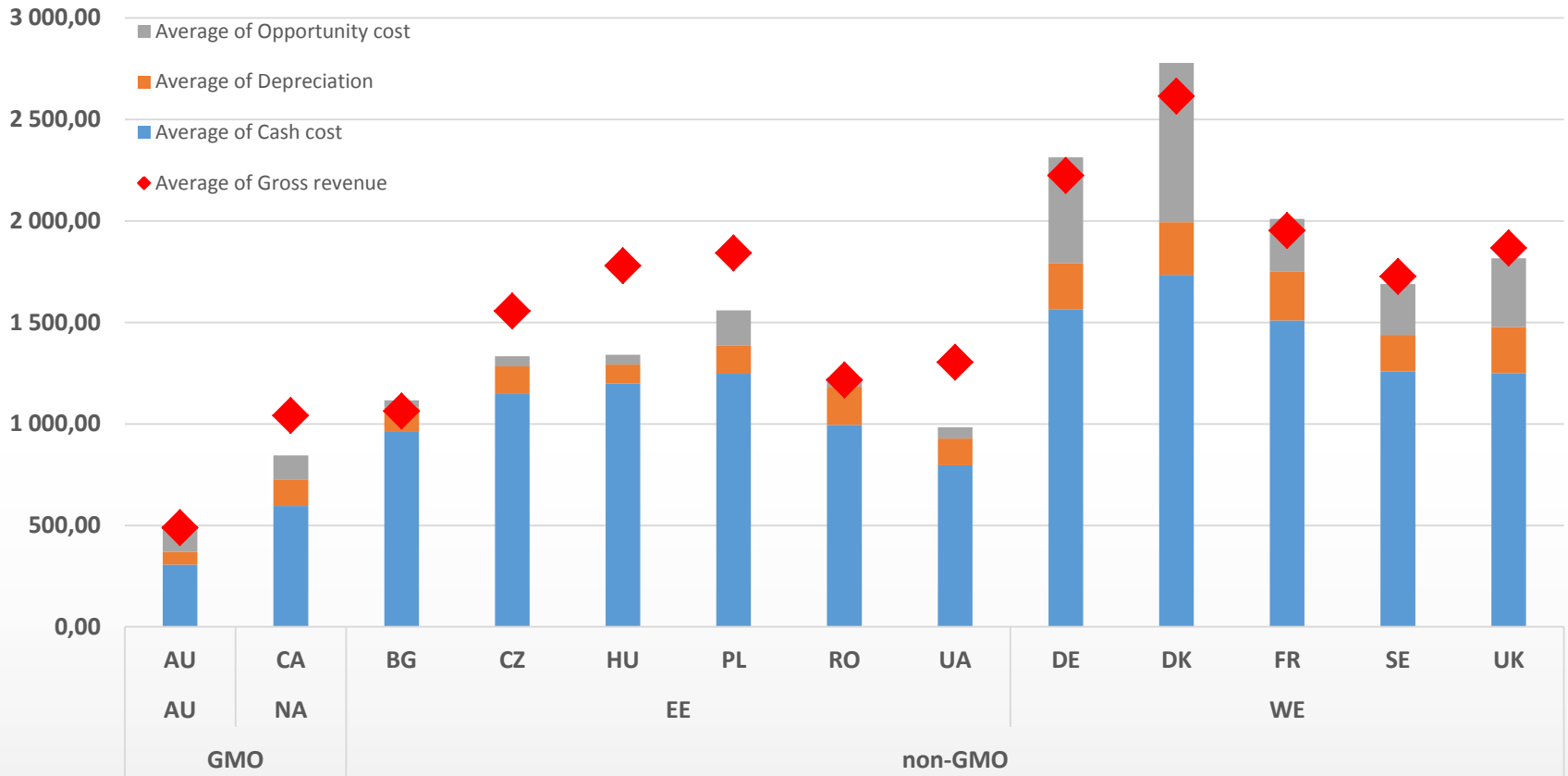
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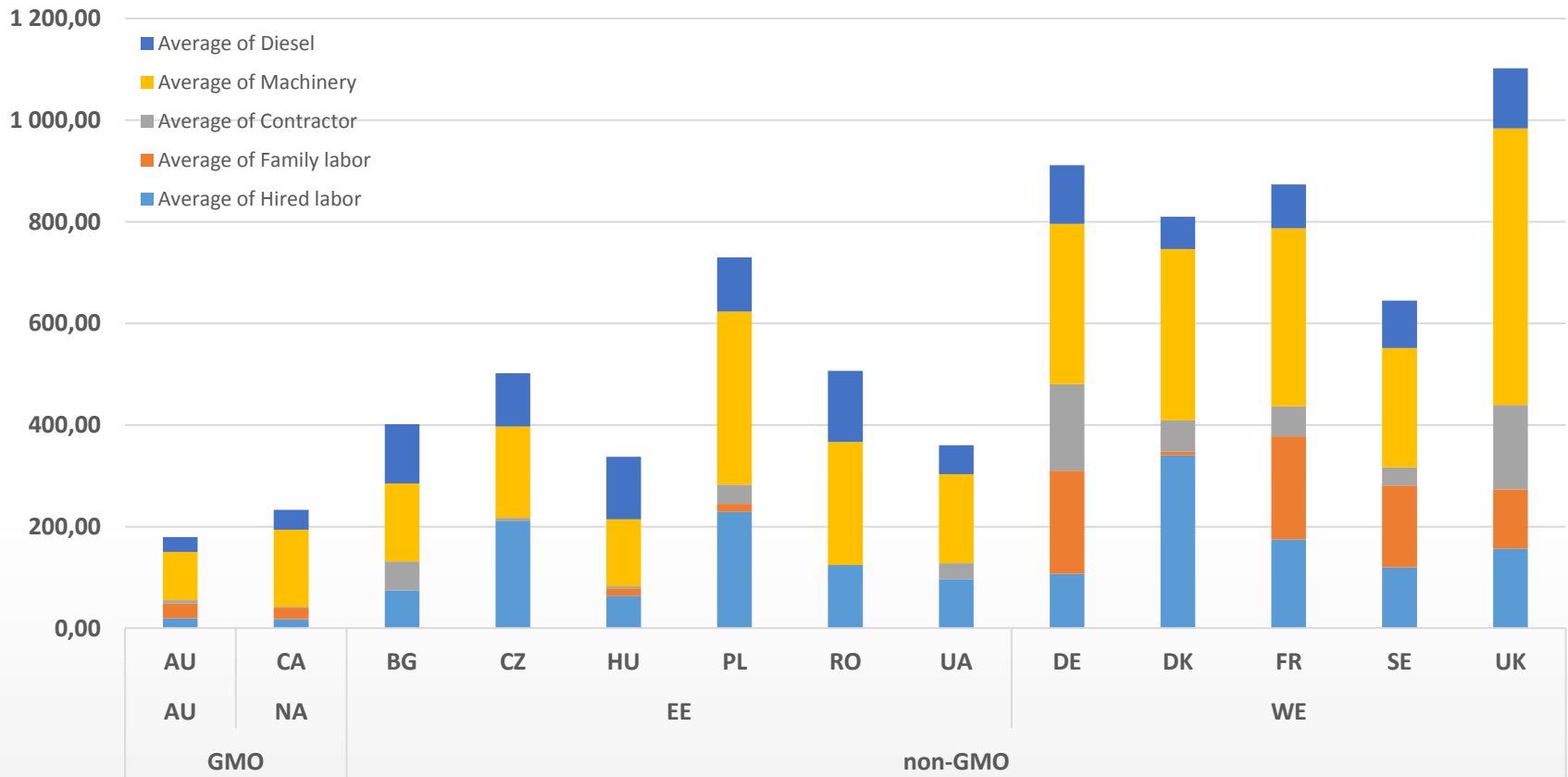
Other

1. **Interesting fact from a farmer in Australia: In the East, the price difference between GM and non-GM canola is usually around 30-50 AUD/t, but could be up to 100 AUD/t!**
2. **Does winter rapeseed not need as much weed control and therefore the effect of herbicide resistant, genetically modified varieties would not be as beneficial as in spring rapeseed?**
- 3.

Total Cost and Gross Revenue (USD/ha, 2012-2015)

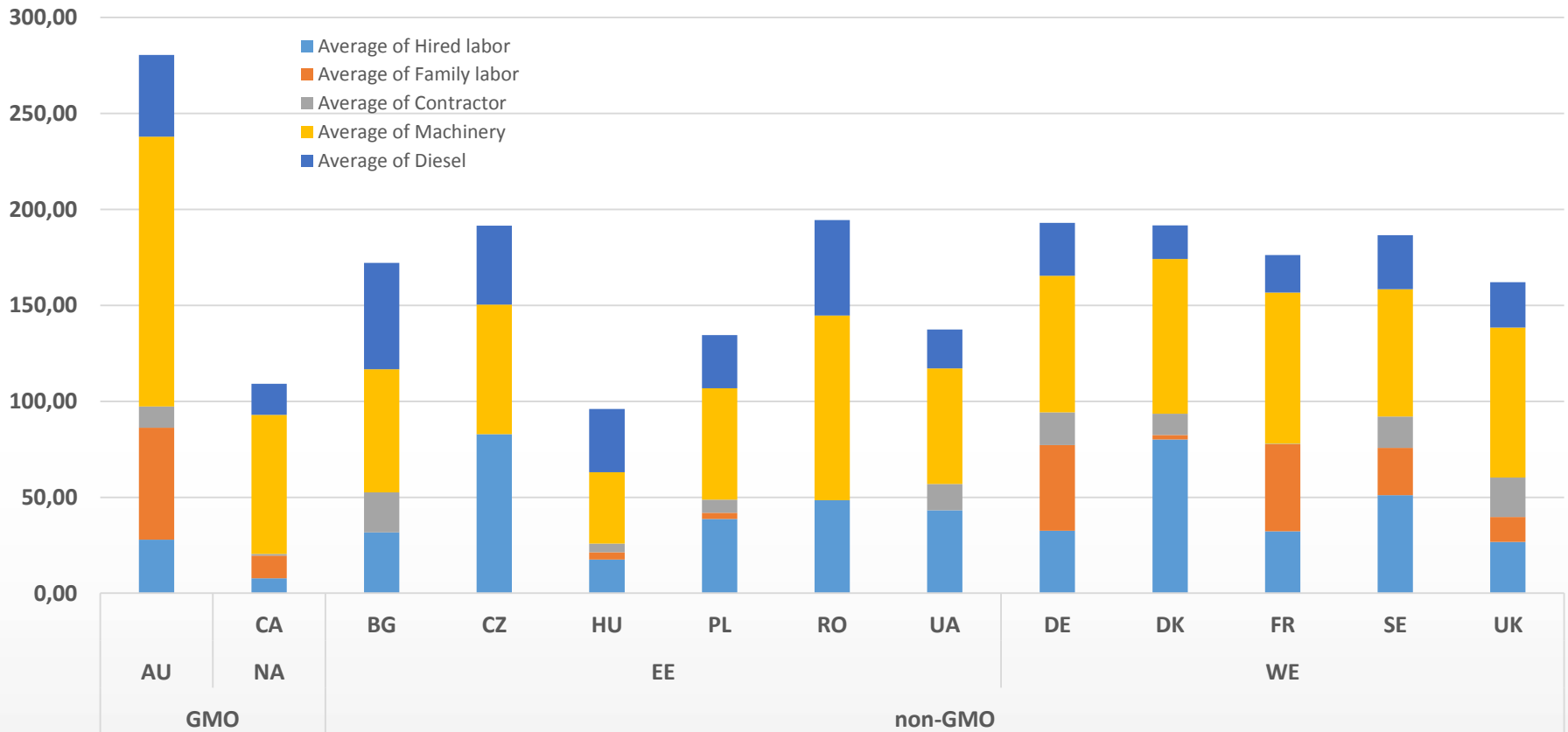


Operating Cost (USD/ha, 2012-2015)



1. Leaders in Operating Costs are Canada and Australia. Zero/Reduced tillage = reduced labor and fuel

Operating Cost (USD/t, 2012-2015)



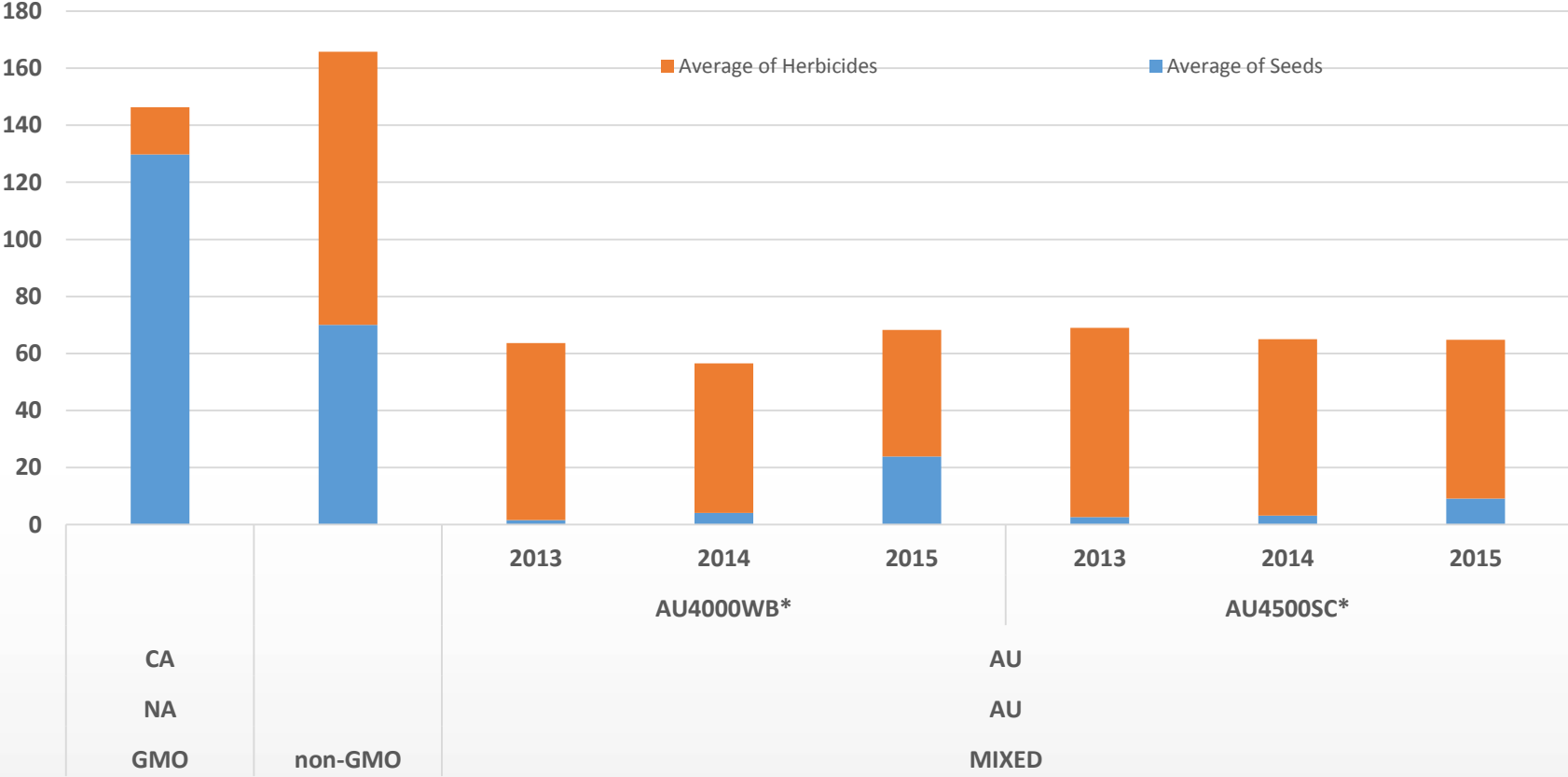
1. High yields justify high costs per ha => much more even picture on cost per ton

GM Canola in Australia (2010 to 2011)

State	Growers accredited	Area planted (ha)	Tonnes delivered
NSW	132	24,043	32,879
Victoria	96	36,497	58,713
Western Australia	743	72,793	47,491
Total	971	133,333	139,083

Source: Australian Oilseed Federation

Seed and Herbicide Cost: AU vs. REST (USD/ha, 2013-2015)



1. Australia 2015: increase in seed costs. Increase usage of GM-rapeseed and/or introduction of hybrid seeds?

Seed and Herbicide Cost: AU vs. REST (USD/t, 2013-2015)

