



Adoption and impact of GM crops: 20 years experience



*Graham Brookes
PG Economics Ltd
UK*

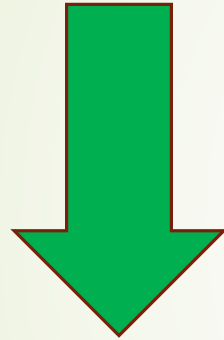


Background

- Author of 22 papers on GM crop impacts in peer review journals
- Current review in 2 open access papers in journal GM Crops. www.tandfonline.com/
- Full report available at www.pgeconomics.co.uk

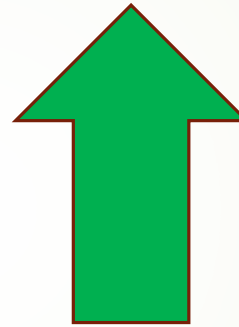
Key Findings

Pesticide
change 1996-2014



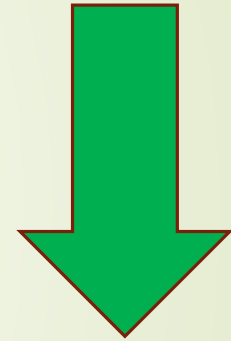
581 million kg
reduction in
pesticides &
18.5% cut in
associated
environmental
impact

Global farm income
1996-2014



\$150.3 billion
increase

Carbon emission 2014

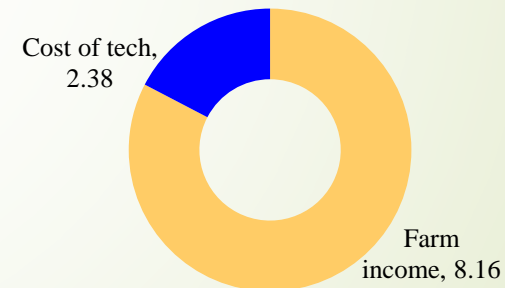
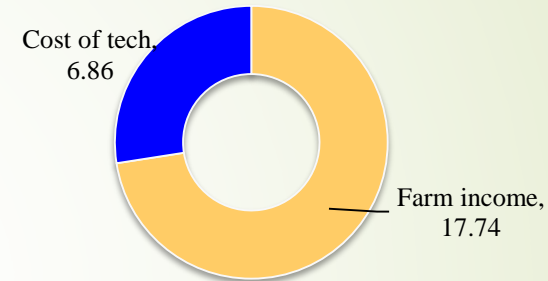


cut of 22.4 billion
kg co2 release;
equal to taking 10
million cars off the
road

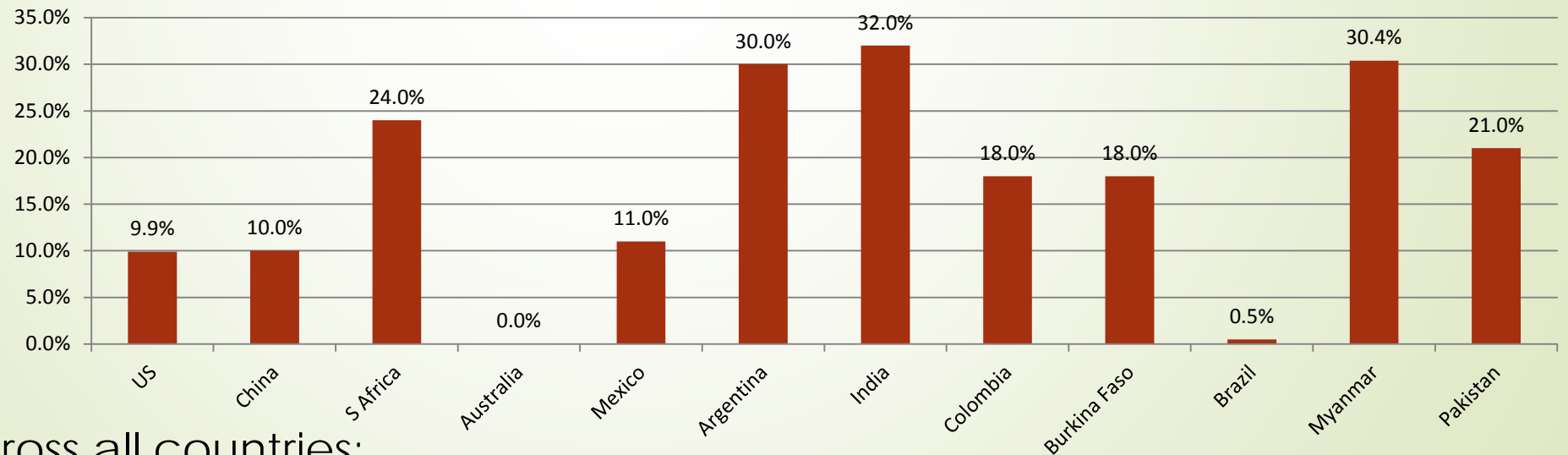
Farm income benefit & cost of accessing the technology (\$ billion) 2014

- Distribution of total trait benefit: all (tech cost 28%) – every \$1 invested in seed = \$3.59 in extra income
- Distribution of benefit: developing countries (tech cost 23%) every \$1 invested in seed = \$4.42 in extra income

Cost of tech goes to seed supply chain (sellers of seed to farmers, seed multipliers, plant breeders, distributors & tech providers)

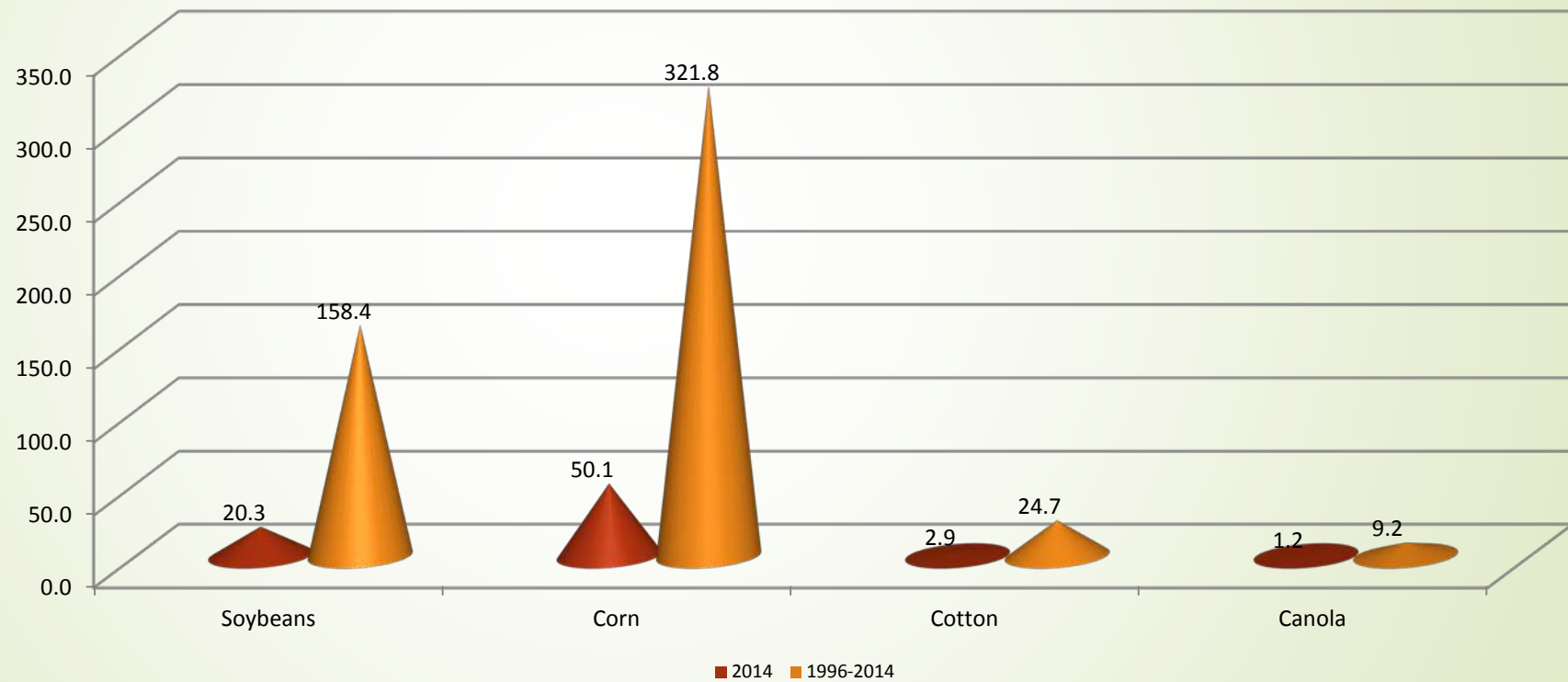



IR cotton: average yield increase 1996-2014



Average across all countries:
+17.3%

Additional crop production arising from positive yield effects of biotech traits 1996-2014 (million tonnes)





Additional conventional area required if biotech not used (m ha)

	2014	1996-2014
Soybeans	7.50	58.68
Maize	8.87	56.99
Cotton	3.68	31.43
Canola	0.59	4.57
Total	20.64	151.67



Impact on pesticide use

- ▶ Since 1996, use of pesticides down by 581 m kg (-8.2%) & associated environmental impact -18.5% - equivalent to total China pesticide active ingredient use on crops for more than one year
- ▶ Largest environmental gains from GM IR cotton: savings of 249 million kg insecticide use & 28% reduction in associated environmental impact of insecticides

Reduced GHG emissions: 2014

- ▶ Reduced fuel use (less spraying & tillage) = 2.4 billion kg less carbon dioxide
- ▶ Facilitation of no/low till systems = 20 billion kg of carbon dioxide not released into atmosphere

Equivalent to removing 10 million cars — 34% of cars registered in the United Kingdom — from the road for one year





Concluding comments and UK perspective

- ▶ There is a considerable body of evidence in peer reviewed literature quantifying impacts of GM crop technology
- ▶ Impacts have largely been positive for both farmers and citizens in user countries
- ▶ UK farmers not been provided with opportunity to try/use the technology – due to poorly functioning and non-science based EU regulation = most biotech R & D takes place outside EU and focuses on crops/issues of little relevance to UK agriculture
- ▶ Leaving EU may provide opportunity for more science-based regulation and may stimulate more R & D of relevance to UK agriculture BUT
- ▶ Considerable time lag for R & D and bringing products to market = any such developments are still many years away