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Company	Rating	Price	Target
Sustainability - Agriculture & Food Tech			
CTVA-NYSE	Buy	US\$57.33	US\$75.00
DE-NYSE	Buy	US\$409.51	US\$530.00

Priced as of close of business 27 June 2023

Initiating coverage on AgBiotech and Precision Ag leaders

We are initiating coverage of **Corteva (NYSE: CTVA)** with a **BUY** and **\$75 price target** and **John Deere (NYSE: DE)** with a **BUY** and **\$530 price target**, broadening our AgTech coverage to include large-cap players in Ag Biotech and Precision Ag, respectively. As a rising global population and decreasing arable land challenge industrial agriculture’s ability to deliver sufficient levels of production, farmers face the daunting task of growing more food with waning natural resources. Against this backdrop, innovations across Ag inputs and equipment should provide key pillars for necessary change. While Corteva and Deere are leading incumbents within the conventional farming system, they are also respective Ag Biotech and Precision Agriculture leaders, whose innovations are helping drive a transition to sustainable agricultural production.

We believe the long-term annual growth rate for biologicals market to be more than 2x that of the conventional crop protection and fertilizer markets. This conforms to views expressed by agrichemical incumbents, including Corteva, which sees the share of biological crop protection reaching 20-25% by 2035 (CG currently estimates biopesticides at roughly 5% of total crop protection market). Within crop protection, much of the sector’s growth is likely to come from gains in row crops and herbicides, while biofertilizers are also likely to make significant strides in adoption. CG estimates the total market for precision agriculture was approximately US\$9.5B in 2020, and we expect growth of about 12% annually through 2025 to reach US\$17B. Within our estimates, we note that the specific markets for data analytics, drones, sensors, and autonomous and semi-autonomous farm equipment represent distinct multi-billion-dollar opportunities.

Corteva maintains substantial IP and distribution reach across seeds and agrichemicals. With its seed trait technology and expanding biologics portfolio seeing healthy adoption, we see attractive revenue and profitability growth ahead (Revenue +5% CAGR '22-'24E and EBITDA+ 12% CAGR '22-'24E). Our \$75 price target is based on 15.2x EV/EBITDA ('24E), a 28% premium to CTVA’s 3-year NTM average EV/EBITDA multiple of 11.9x. We note that CTVA price target reflects a PEG ratio of 1.3x (we calculate PEG using 2024E EV/EBITDA multiple and EBITDA CAGR ('22-'24)), an attractive PEG underpinned by the company’s substantially stronger growth rate of 12% EBITDA CAGR '22-'24 vs a 1% peer average. We see justification for a modest premium versus its average EV/EBITDA multiple given improvements under new management, combined with a solid growth outlook through 2024. As a proven consolidator, upside to our estimates could come from continued inorganic expansion of the company’s biologics offering.

Since its keynote at CES in 2022, John Deere has received increasing attention as a major provider of semi-autonomous and autonomous Ag equipment solutions, while interest in AI is putting the company’s vast agronomic data set in the spotlight, dovetailing nicely with Deere’s ongoing focus on building out its ancillary precision Ag solutions. Our \$530 price target (17.1x PE on F24E) is a 7% premium to DE’s trailing 5-year average forward PE multiple of 16x.

Table of contents

Corteva financial overview	5
Corteva valuation.....	6
John Deere financial overview.....	11
John Deere valuation	11
Ag through the sustainability lens.....	14
Governmental, corporate, and consumer-driven change.....	15
Agricultural Biotechnology industry overview	18
Biologicals industry overview	21
Corteva Ag Biotech overview	26
Precision Agriculture industry overview	31
John Deere Precision Ag overview	35
Corteva and Deere operate within the realities of agriculture cycles.....	38
Historical Ag cycles.....	39
Where are we in the current cycle?.	41
Interest rate impact.....	46
Data releases impact cycle expectations.....	48
Corteva management overview.....	50
Corteva risks.....	52
John Deere management overview.....	53
John Deere risks.....	56

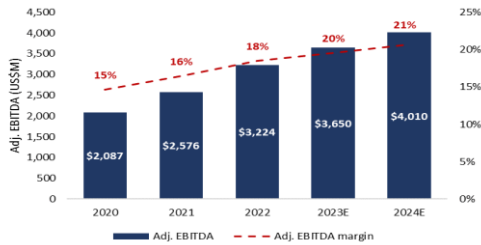
Figure 1: Summary Sheet

Corteva (NYSE: CTVA) & John Deere (NYSE: DE) Initiation Summary Sheet

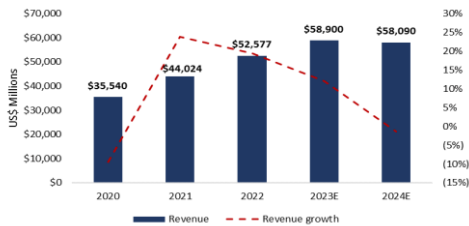


Thesis

Corteva maintains substantial IP and distribution reach across seeds and agrichemicals. With its seed trait technology and expanding biologics portfolio seeing healthy adoption, we see attractive revenue and profitability growth ahead (Revenue +5% CAGR '22-'24E and EBITDA+ 12% CAGR '22-'24E).



Since its keynote at CES in 2022, **John Deere** has received increasing attention as a major provider of semi-autonomous and autonomous ag equipment solutions, while interest in AI is putting the company's vast agronomic data set in the spotlight, dovetailing nicely with Deere's ongoing focus on building out its ancillary precision ag solutions.



Industry Metrics

Biologicals are positioned for strong growth

- We believe the long-term annual growth rate for biologicals market to be **more than 2x** that of the conventional crop protection and fertilizer markets.
- A survey of market size estimates through the end of this decade reveals growth expectations averaging slightly above **13%**, well north of low-mid single digits for conventional products.
- This conforms to views expressed by agrichemical incumbents including Corteva, which sees the share of biological crop protection reaching **20-25%** by 2035 (CG currently estimates biopesticides at **roughly 5%** of total crop protection market).

Precision agriculture should grow at double-digit clip

- CG estimates the total market for precision agriculture was approximately **US\$9.5B in 2020**, and we expect growth of about **12% annually** through 2025 to reach **US\$17B**.
- Globally the farm equipment market is many times the size of precision Ag, projected at US\$140B over the next five years according to Fior Markets.

Valuation and Estimates

Corteva (NYSE: CTVA)

- We are establishing a Buy rating and \$75 price target, based on 15.2x EV/EBITDA ('24E), a 28% premium to CTVA's 3-year NTM average EV/EBITDA multiple of 11.9x. We note that CTVA price target reflects a PEG ratio of 1.3x (we calculate PEG using 2024E EV/EBITDA multiple and EBITDA CAGR ('22-'24)), an attractive PEG underpinned by the company's substantially stronger growth rate of 12% EBITDA CAGR '22-'24 vs a 1% peer average. We see justification for a modest premium versus its average EV/EBITDA multiple given improvements under new management, combined with a solid growth outlook through 2024. As a proven consolidator, upside to our estimates could come from continued inorganic expansion of the company's biologics offering

- In Q2 and FY 2023, our model calls for 4% and 7% YoY top-line growth reaching \$6,500 million and \$18,700 million, respectively. We project FY 2024 revenue growth of 4% to \$19,400 million. We expect CTVA to expand its gross margins by 300 basis points, from 40% to 43% from 2022 to 2024. On the adj. EBITDA front, we anticipate the company to deliver adj. EBITDA margins of 20% and 21% in 2023 and 2024, respectively.

John Deere (NYSE: DE)

- We are initiating with a Buy rating and \$530 price target (17.1x PE on F24E), a 7% premium to DE's trailing 5-year average forward PE multiple of 16x.

- In FQ3 and Fiscal 2023, our model calls for 3% and 12% YoY total sales growth reaching \$14,591 million and \$58,900 million, respectively. Turning to fiscal 2024, we expect total revenue to decline 1% to \$58,090 million, primarily due to the lag effect of declining farmer gross income projected for 2023.

Sustainability Drivers

Substantial sustainability benefits can be derived through precision agriculture

- **Using less fertilizer, pesticide, water and other resources** for the same or better yields inflicts less damage on soil and the surrounding environment without compromising the long-term ability to produce enough food for growing populations.
- **Cost savings and revenue potential** (many of which have been quantified) and, we expect, benefits to the environment will increasingly become part of this calculus going forward.

Biologicals offer sustainable alternatives to synthetic chemicals

- They **reduce the amount of synthetic chemicals** applied to crops.
- They **promote microbial diversity in the soil and improve soil's "carbon sink" potential**.
- Other benefits include: include **lowering input costs, reducing pest resistance, increasing yields, protecting beneficial insects, and potentially generating an additional income stream through carbon credits**.
- Farmer incomes may also benefit from the higher prices.

Source: Company reports, Canaccord Genuity estimates

Initiating coverage of large cap AgTech incumbents CTVA and DE

Following our financial projections and a valuation discussion for each company, we review in greater detail the drivers of greater yield requirements, examining how Corteva and Deere are providing contributions to that effort. We also discuss realities of the current agriculture cycle that may contribute to near-term choppiness for both stocks, providing context through an overview of key variables within an Ag cycle and reviewing historical examples.

Thesis highlights:

Substantial longer-term growth drivers in place for Ag inputs and equipment

- Need to boost yields to feed growing population using less arable land
- Regulators and consumers pressuring shift to more sustainable forms of food production.

Well positioned to address key yield and sustainability goals for the industry

- CTVA is enhancing its seed and crop protection portfolio with meaningful investments in biologics.
- DE is at the center of precision Ag enablement through autonomy, data acquisition, and precision planting.

Expect near-term choppiness given cross currents within cyclical Ag drivers

- Farm income pulling back modestly in 2023 following strong period of growth.
- Geopolitical risks remain within food system, including prolonged impact on grain production out of Ukraine.

We see solid upside for both stocks

- CTVA: Initiating coverage with a Buy rating and \$75 price target, based on 15.2x EV/EBITDA ('24E), a 28% premium to CTVA's 3-year NTM average EV/EBITDA multiple of 11.9x.
- DE: Initiating coverage with a Buy rating and \$530 price target (17.1x PE on F24E), a 7% premium to DE's trailing 5-year average forward PE multiple of 16x.

Figure 2: Corteva Biological Crop Solutions



Source: Company Reports

Figure 3: John Deere's Machine Sync



Source: Company Reports

Corteva: Seed traits and biologics leader

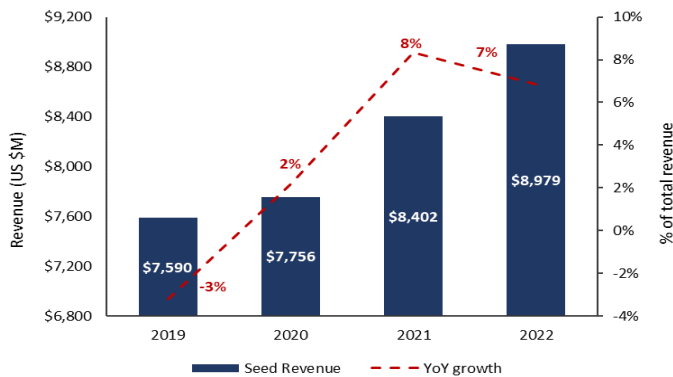


As a major global player in Ag inputs, Corteva commands a leading IP position and substantial distribution reach across seeds and agrichemicals. We see the company's seed trait technology and expanding biological crop protection and nutrition portfolio supporting strong revenue and profitability growth, while helping enable agriculture's transition to sustainable production methods. Our outlook for healthy EBITDA growth through 2024 (12% CAGR '22-'24E) justifies a valuation premium for Corteva, in our view, and we have initiated coverage with a **BUY** rating and **\$75 price target**.

Corteva operates through two revenue segments, **Seed** and **Crop Protection**. The **Seed** segment specializes in the production and delivery of commercial seed. By integrating advanced germplasm and desirable traits, it enables farmers across the globe to achieve optimal yields. Historically, revenue growth for the Seed division ranged between low- to high-single-digits, with mid- to high-teens operating EBITDA margins (18% in 2022). In 2019 and 2022, the Seed segment accounted for 55% and 51% of total revenue, respectively.

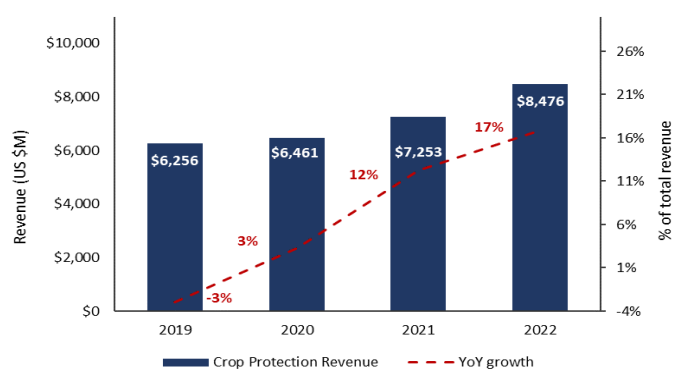
The **Crop Protection** segment offers products to safeguard crop yields from weeds, insects, and diseases, helping farmers to achieve the best possible outcomes. Historically, revenue growth for the Crop Protection division ranged between low single digits to low double digits with mid- to high-teens operating EBITDA margins (20% in 2022). In 2019 and 2022, the crop protection segment accounted for 45% and 49% of total revenue, respectively.

Figure 4: Seed revenue



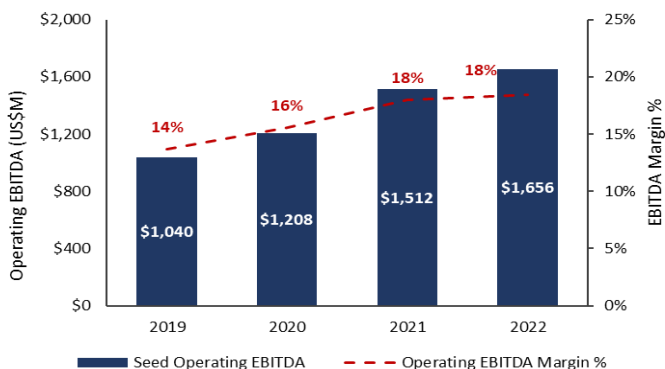
Source: Company reports, Canaccord Genuity Research

Figure 5: Crop Protection revenue



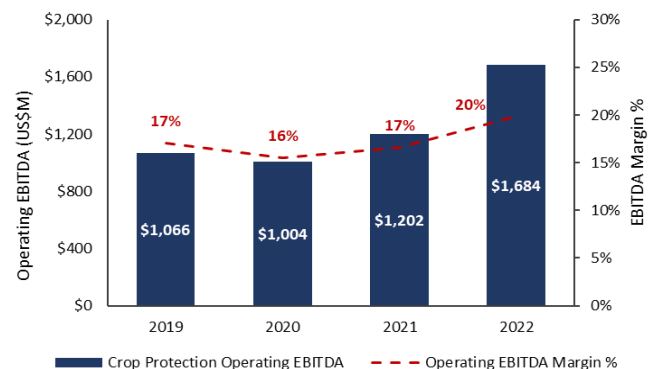
Source: Company reports, Canaccord Genuity Research

Figure 6: Seed operating EBITDA



Source: Company reports, Canaccord Genuity Research

Figure 7: Crop Protection operating EBITDA

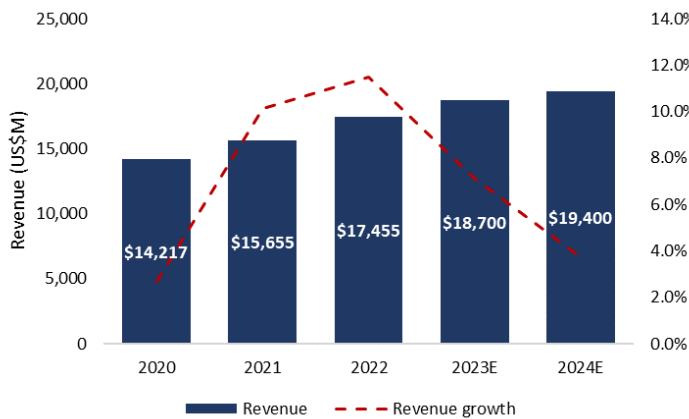


Source: Company reports, Canaccord Genuity Research

Our estimates and price target call for strong growth and solid upside for the stock

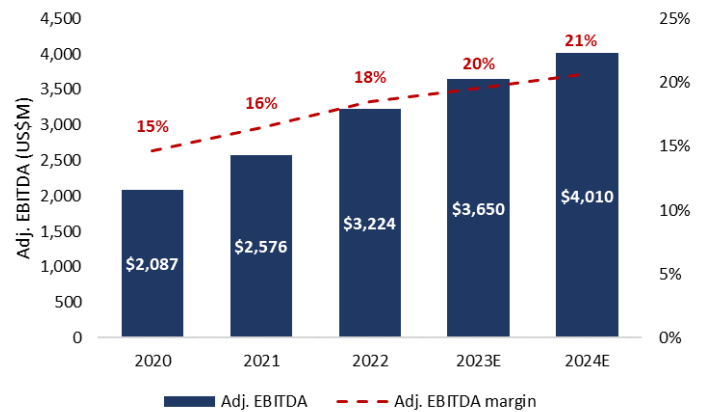
Our model calls for YoY top-line growth of 4% in Q2 and 7% YoY in FY 2023, reaching \$6,500 million and \$18,700 million, respectively. We anticipate FY 2023 growth will be fueled by 9% and 6% YoY increases in the Crop Protection and Seed segments, reaching \$9,209 million and \$9,491 million, respectively. During the first half of 2023, Seed growth is anticipated to be driven by continued favorable pricing and increased US corn acres. For Crop Protection, first half 2023 volumes are expected to be down, according to management, as growth from new products will be offset by more than \$200 million of strategic product exits. We project FY 2024 revenue growth of 4% to \$19,400 million. We expect Corteva to expand gross margins by 300 basis points, from 40% in 2022 to 43% in 2024. On the adj. EBITDA front, we expect the company to deliver adj. EBITDA margins of 20% and 21% in 2023 and 2024, respectively. Our \$75 price target is based on EV/EBITDA multiple of 15.2x (FY 2024E), a 28% premium to CTVA's three-year NTM average EV/EBITDA multiple of 11.9x.

Figure 8: Revenue estimates



Source: Company reports, Canaccord Genuity estimates

Figure 9: Adj. EBITDA estimates



Source: Company reports, Canaccord Genuity estimates

Valuation premium supported by premium growth rate

Figure 10: DCF (US\$M)

Implied Share Price	
	Perp. Growth
Present Value of Cash Flow s	\$19,897
Present Value of Terminal Value	\$36,095
Enterprise Value	\$55,992
Plus: Cash & Cash Equivalents	2,153.0
Less: Non-Controlling Interest	(240.0)
Less: Debt	(5,028.0)
Equity Value	\$52,877
Diluted Shares Outstanding	716.2
Implied Share Price	\$73.83

Source: Company reports, Canaccord Genuity estimates

EV/EBITDA multiple method

We are establishing a \$75 price target, based on 15.2x EV/EBITDA ('24E), a 28% premium to CTVA's three-year NTM average EV/EBITDA multiple of 11.9x. We note that our price target reflects a PEG ratio of 1.3x (we calculate PEG using 2024E EV/EBITDA multiple and EBITDA CAGR ('22-'24)), an attractive PEG underpinned by the company's substantially stronger growth rate of 12% EBITDA CAGR '22-'24 vs a 1% peer average. We see justification for a healthy premium versus its average EV/EBITDA multiple given improvements under new management, combined with a solid growth outlook through 2024.

While not the basis of our price target, our DCF also suggests solid upside

Our \$73.83 implied share price is based on an 3.5% revenue CAGR FY'22-32E, an 8.4% WACC, a 23% tax rate, and a 3% terminal growth rate. Additionally, we are utilizing Q1 2023 balance sheet values for cash and cash equivalents of \$2.2 billion, debt of \$5 billion, and \$240 million in non-controlling interest.

Comparable company valuation analysis

When looking at broadline AgTech peers, the company trades at a 39% premium on a 2024E EV/sales basis (2.3x vs. 1.6x) and a 41% premium in terms of 2024E EV/EBITDA (11x vs 7.8x). We note that CTVA appears poised to deliver superior

growth versus peers at a projected 2022-2024E revenue CAGR of 5% vs. 1% and EBITDA CAGR of 12% vs 1%.

Figure 11: CTVA comp table

Ticker	Stock Price	Mkt. Cap.	EV	2022E		2023E			2024E			2YR CAGR ('22-'24)						
				EV/Revenue	EV/EBITDA	EV/Revenue	EV/EBITDA	Revenue Growth	EBITDA Growth	EBITDA Margin	EV/Revenue	EV/EBITDA	Revenue Growth	EBITDA Growth	EBITDA Margin	Revenue CAGR	EBITDA CAGR	
				x	x	x	x	%	%	%	x	x	%	%	%	%	%	
Corteva	CTVA	\$57.33	\$41,060	\$44,175	2.5x	13.7x	2.4x	12.1x	7%	13%	20%	2.3x	11.0x	4%	10%	21%	5%	12%
ADM	ADM	\$73.89	\$40,243	\$51,564	0.5x	7.6x	0.5x	8.5x	(2%)	(11%)	6.0%	0.5x	9.2x	0%	(8%)	5.6%	(1%)	(9%)
Advansix	ASIX-US	\$34.50	\$951	\$1,214	0.6x	3.9x	0.7x	5.3x	(15%)	(26%)	13.9%	0.7x	4.7x	5%	12%	14.8%	(6%)	(9%)
BASF	BAS-DE	€ 43.11	\$38,534	\$57,394	0.7x	5.4x	0.7x	6.6x	(7%)	(18%)	10.8%	0.7x	5.7x	3%	15%	12.1%	(2%)	(3%)
Bayer	BAYN-DE	€ 50.26	\$49,377	\$87,807	1.7x	6.5x	1.8x	7.1x	(2%)	(9%)	24.7%	1.7x	6.7x	3%	6%	25.6%	0%	(2%)
Bioceres	BIOX	\$13.28	\$838	\$1,017	3.0x	16.4x	2.4x	10.7x	29%	53%	22.1%	1.9x	7.7x	24%	39%	24.8%	26%	46%
Bunge	BG-US	\$92.41	\$13,917	\$18,374	0.3x	5.6x	0.3x	6.2x	(4%)	(9%)	4.6%	0.3x	6.7x	(1%)	(7%)	4.3%	(3%)	(8%)
Dow Inc.	DOW	\$52.57	\$37,184	\$49,851	0.9x	5.4x	1.0x	8.1x	(15%)	(34%)	12.8%	1.0x	6.6x	5%	23%	15.1%	(6%)	(10%)
DuPont de Nemours	DD-US	\$69.20	\$31,764	\$35,303	2.7x	10.8x	2.8x	11.6x	(5%)	(7%)	24.4%	2.7x	10.4x	6%	11%	25.7%	1%	2%
Eastman Chemical Company	EMN-US	\$81.71	\$9,736	\$14,780	1.4x	8.1x	1.4x	8.1x	(3%)	1%	17.9%	1.4x	7.3x	4%	10%	18.9%	0%	5%
FMC Corp.	FMC	\$105.10	\$13,142	\$17,340	3.0x	12.3x	2.8x	11.3x	6%	9%	25.1%	2.7x	10.5x	5%	8%	25.6%	5%	8%
Novozymes	NVZMY-US	\$46.59	\$10,401	\$13,922	5.4x	15.6x	5.2x	15.7x	4%	(1%)	33.5%	5.0x	14.3x	5%	10%	35.0%	4%	5%
Nutrien	NTR-CA	\$77.89	\$38,640	\$58,104	1.2x	3.5x	1.5x	6.0x	(20%)	(41%)	24.4%	1.5x	6.4x	(2%)	(7%)	23.3%	(12%)	(26%)
UPL	512070-IN	₹ 674.05	\$505,947	\$743,098	1.4x	6.6x	1.3x	6.0x	6%	10%	21.7%	1.2x	5.1x	8%	16%	23.3%	7%	13%
Verde AgriTech	NPK-CA	\$2.18	\$115	\$153	1.8x	5.8x	NA	2.9x	NA	101%	NA	NA	NA	NA	NA	NA	NA	NA
					Mean:	8.1x	1.7x	8.1x	(2%)	1%	19%	1.6x	7.8x	5%	10%	20%	1%	1%
					Median:	6.5x	1.4x	7.6x	(3%)	(8%)	22%	1.4x	6.7x	5%	10%	23%	0%	(2%)

Source: FactSet, Company reports, Canaccord Genuity estimates

Balance sheet and cash flow

As of fiscal Q1 2023, CTVA had \$2,153 million in cash, restricted cash and cash equivalents; \$5,028 million in debt (\$3,787 million in short-term borrowings and finance lease obligations and \$1,241 million in long-term debt); and 716.2 million diluted shares. The company's capex in Q1 was \$151 million. For the full year 2023, we expect CTVA's capex to come in at \$615 million, in line with company guidance. Additionally, we expect FCF for 2023 to be at \$1.3 billion.

EBITDA margin expansion opportunities driven by value creation framework

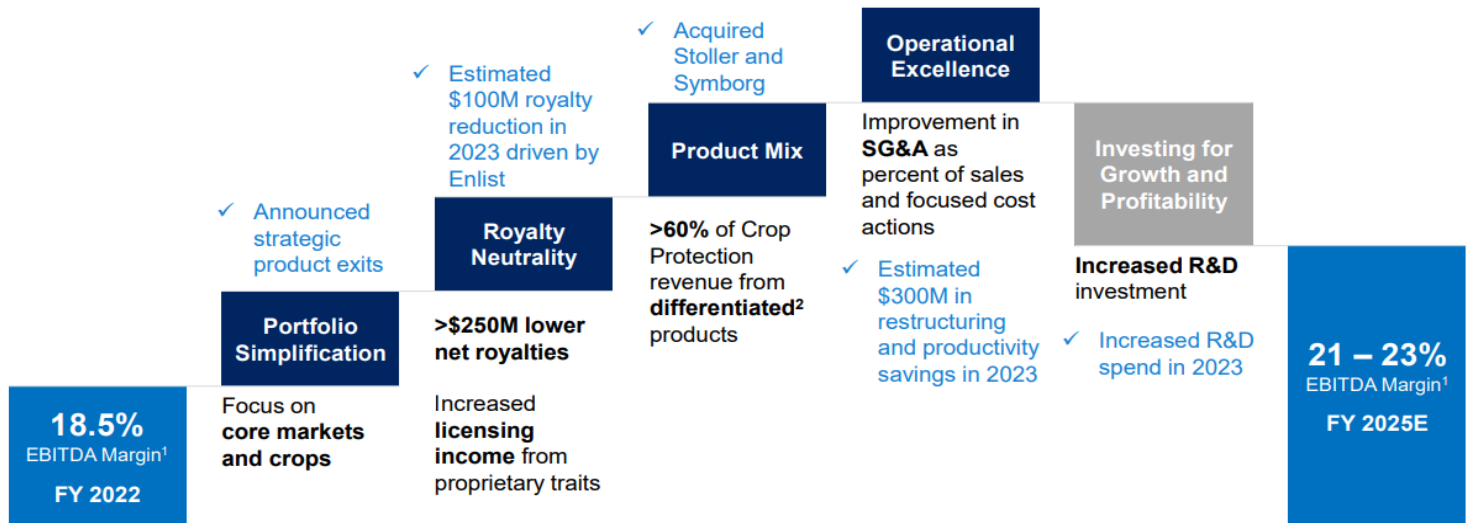
CTVA has identified multiple opportunities for expanding its EBITDA margin, including portfolio simplification, royalty neutrality, product mix improvement, operational excellence, and increased R&D investment. Management expects these opportunities to raise margins from 18.5% in 2022 to a range of 21-23% by 2025E.

As part of its portfolio simplification strategy, CTVA plans to streamline its operations to focus on 110 countries, reducing its presence in approximately 35 geographies. The company intends to allocate full resources and support to around 20 countries, while in other countries, it will only sell its technology without a significant physical infrastructure. Furthermore, CTVA intends to narrow its product focus to crops that possess substantial and distinctive technology. For example, in the Seed segment, the company will primarily concentrate on corn, soybeans, canola or winter oilseed rape, sunflower, cotton, and sorghum. In the Crop Protection segment, CTVA will focus on fruits and vegetables, corn, soybeans, cereals, and rice. Specifically in the Crop Protection segment, the company will prioritize sustainable agricultural chemistries, leveraging its differentiated or unique solutions for specific crops or countries. Additionally, CTVA will make investments and prioritize the growth of specific routes to market, including its rapidly expanding Brevant channel.

When considering the royalty neutrality opportunity, CTVA intends to make substantial reductions in royalties associated with Enlist, gradually transitioning to become a major licensor of technology. Regarding the product mix improvement opportunity, the company will primarily concentrate on expanding its portfolio of differentiated products. This includes emphasizing its Spinosyn and naturally inspired fungicide franchises Furthermore, by implementing price and productivity measures and enhancing overall operational efficiency, CTVA aims to achieve approximately \$400 million in savings from 2023 to 2025. Additionally, the company

has set a target to invest approximately 8% of sales in R&D and innovation, representing an increase from current levels.

Figure 12: Value creation framework



Source: Company reports

Growth fueled by innovation and technology

CTVA's R&D initiatives and innovation pipeline are integral to its growth and investment strategy. The company believes that its pipeline holds significant value, with an expected peak net trade revenue of approximately \$24 billion by 2035 and a projected 45% accretion rate.

The company believes that its pipeline holds significant value, with an expected peak net trade revenue of approximately **\$24 billion by 2035** and a projected **45%** accretion rate

In the Seed segment, with an estimated pipeline value of \$15 billion, CTVA anticipates that its next-generation traits in corn will contribute to increased margins. Furthermore, CTVA projects that the Brazil Conkesta E3 soybean will capture 35% market share by the end of the decade. CTVA also possesses a significant advantage in corn, boasting an 8 bushel per acre yield advantage in the US. However, the company's focus goes beyond yield, encompassing considerations of nutrition and sustainability. In the soybean market, CTVA's Enlist technology is rapidly emerging as a leader in North America, and the company has plans to expand its success to Brazil in the latter half of the decade.

CTVA projects that the Brazil Conkesta E3 soybean will capture a **35% market share** by the end of the decade.

In the Crop Protection segment, with an estimated pipeline value of \$9 billion, CTVA aims to introduce over 10 new active ingredients between 2022 and 2035, prioritizing differentiated and sustainable products.

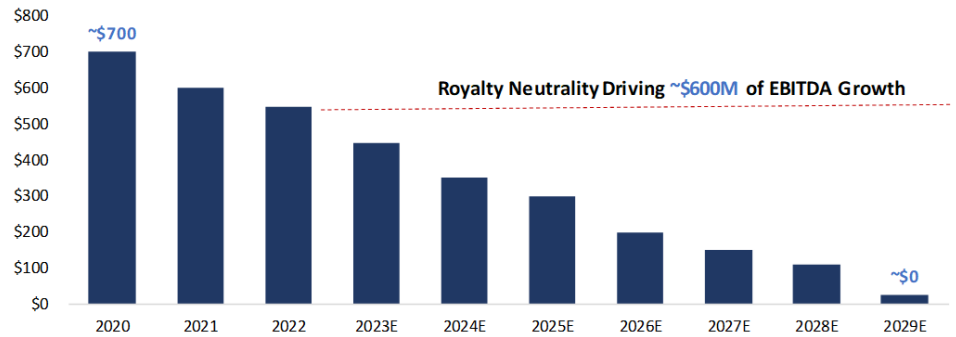
CTVA aims to introduce over **10 new active ingredients** between 2022 and 2035 in the Crop Protection segment.

CTVA recognizes significant growth opportunities in emerging markets such as biologicals, bio-based fuels, and specialty protein and oils, which offer multibillion-dollar opportunities. To capitalize on these markets, CTVA plans to redirect its R&D investments and explore strategic partnerships, driving advancements in science and technology and generating substantial value.

Royalty neutrality to deliver margin expansion

CTVA plans to shift from relying on third parties to utilizing its proprietary traits, which it expects to lead to margin expansion of over 120 basis points between 2022 and 2025. The company's net royalty expense was approximately \$700 million in 2020, and it anticipates eliminating this expense entirely by 2029, thereby driving approximately \$600 million of EBITDA growth over the specified period.

Figure 13: Path to royalty neutrality



Source: Company reports, Canaccord Genuity Research

Solid long-term outlook

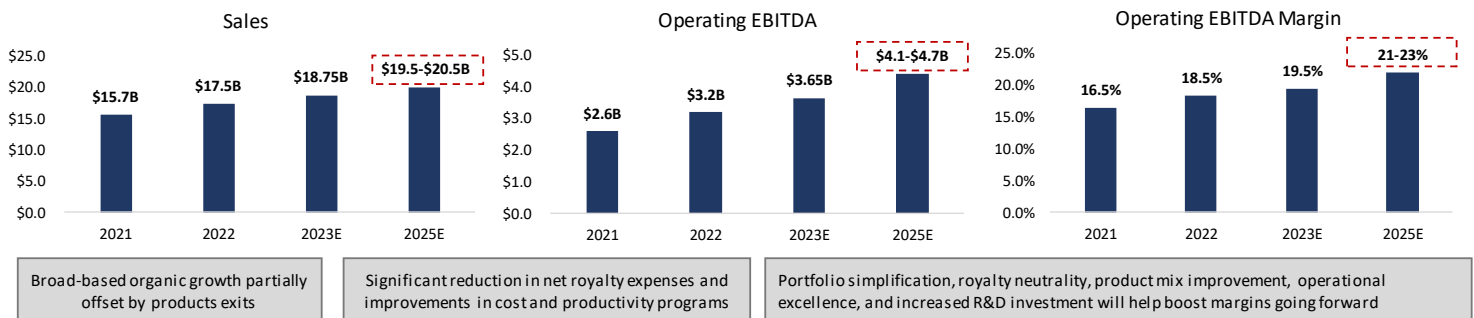
The company anticipates that a combination of broad organic growth and portfolio exits will drive sales going forward. CTVA expects a three-year revenue CAGR of approximately 4-5%, resulting in a revenue range of \$19.5-\$20.5 billion by 2025. Additionally, a significant reduction in net royalty expenses and improvements in cost and productivity programs are projected to lead to adj. EBITDA of around \$4.1-\$4.7 billion with a margin of 21%-23% by 2025. The company also foresees a 17% three-year CAGR for operating EPS, reaching a range of \$3.70-\$4.35 per share.

Portfolio simplification and focused investments are key drivers of revenue growth. The company aims to focus on differentiated products and expand its own proprietary technology, reducing net royalty expenses by more than \$250 million by 2025 and over \$600 million by the end of the decade.

Turning to cost savings, CTVA expects to deliver \$200 million of run-rate savings by 2025. Additionally, SG&A spend should improve by ~200 bps from 2022 to 2025. The improvement in SG&A should provide support for expanded investments in R&D, with CTVA aiming to allocate approximately 8% of sales to R&D to prioritize sustainably advantaged chemistries and technologies. Altogether, these efforts are forecasted to generate savings of over \$400 million from 2023 to 2025.

The company's projected free cash flow to EBITDA conversion rate from 2023 to 2025 is anticipated to be around 65% at midpoint. Additionally, CapEx is expected to be roughly 4% of revenue, which is consistent with the company's current level of capital spend.

Figure 14: Management's long-term model



Source: Company reports, Canaccord Genuity Research, *2023 values represent the mid-point of FY2023 guidance

Management has offered healthy 2023 guidance

The agriculture outlook for 2023 remains strong, with high demand for grain and oilseeds and limited stock availability. Commodity prices are above historical averages, and farmers have healthy balance sheets and income levels, which we believe will lead them to prioritize technology for better returns.

Figure 15: 2023 company outlook

<p>Net Sales \$18.6-\$18.9B +7% at mid-point</p>	<p>Operating EBITDA \$3.55 – \$3.75B +13% at mid-point <i>Op. EBITDA Margin +100 bps</i></p>
<p>Operating EPS \$2.80 - \$3.00 +9% at mid-point</p>	<p>Free Cash Flow \$1.2 – \$1.4B <i>CFFO \$1.8 - \$2.0B</i></p>

Source: Company reports, Canaccord Genuity

Corteva has revised its guidance for full-year 2023, raising expectations for sales and earnings and taking into account the impact of its biologicals acquisitions, which management believes should add \$450 million in sales and \$90M million in EBITDA. Corteva anticipates net sales in the range of \$18.6 billion to \$18.9 billion, reflecting 7% growth at the midpoint. Operating EBITDA is expected to be between \$3.55 billion and \$3.75 billion, showing 13% growth at the midpoint. Operating EPS is projected to be in the range of \$2.80 to \$3.00 per share, or 9% growth at the midpoint. These estimates consider higher earnings and a lower average share count but are partially offset by a forecasted higher effective tax rate and interest expense. Free cash flow is anticipated to be between \$1.2 billion and \$1.4 billion, while free cash flow from operations is expected to come in between \$1.8 billion and \$2 billion.

Q1 2023 results overview

Sales in Q1 2023 increased 6% YoY to \$4.9 billion. Organic sales for the same period grew 10%, primarily driven by strong performance in the EMEA and North America regions.

Within the Seed segment, net sales grew by 7% YoY to \$2.7 billion, with organic sales increasing by 10%. This growth was attributed to a 17% increase in prices and a 2% positive impact from portfolio and other factors, partially offset by a 7% decline in volume and a 5% unfavorable currency impact. The price gains were a result of the company's effective implementation of its price for value strategy and the recovery of higher input costs. The decline in volume was influenced by a shorter Safrinha season, supply constraints in Latin America, and the company's exit from Russia.

In the Crop Protection segment, net sales grew by 5% YoY to \$2.2 billion and organic sales increased by 10%. The growth in this segment was primarily driven by value capture in the EMEA region. Price gains reflected the company's successful response to cost inflation, while volume gains were achieved through the continued penetration of new products such as Enlist and Arylex herbicides. However, these gains were offset by product exits and delays in Latin America and APAC regions due to adverse weather conditions.

CTVA reported GAAP net income of \$607 million and EPS from continuing operations of \$0.84 for the first quarter of 2023. Operating EBITDA reached \$1.23 billion, while operating EPS stood at \$1.16 per share. The strong execution of pricing strategies, favorable product mix, and productivity actions more than offset inflation and currency headwinds.

Figure 16: 1Q 2023 financial performance overview

Metric	1Q 2023	Highlights
Net Sales	\$4.88B (+6%)	Strong demand for advantaged technologies in Seed and Crop Protection
Organic Sales	\$5.06B (+10%)	Organic growth in NA, EMEA more than offset weather-related impacts in LATAM
Operating EBITDA	\$1.23B (+18%)	Pricing, new technology, and productivity partially offset by cost headwinds and currency
Operating EBITDA Margin	25.2% (+262 bps)	Margin expansion on pricing/mix and productivity in both segments

Source: Company reports

John Deere: Gathering farm level data for new era of Precision Ag



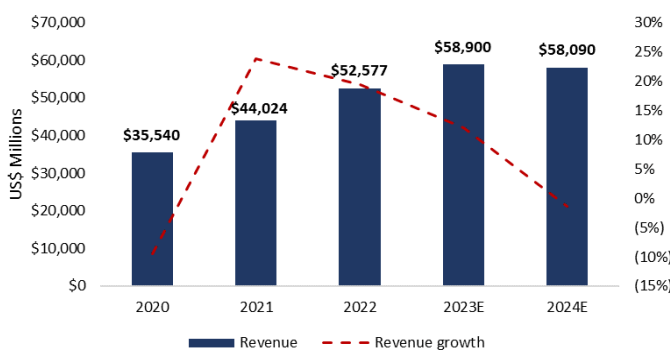
Since its keynote at CES in 2022, John Deere has received increasing attention as a major provider of semi-autonomous and autonomous Ag equipment solutions, while interest in AI is putting the company's vast agronomic data set in the spotlight, dovetailing nicely with Deere's ongoing focus on building out its ancillary precision Ag solutions. We are initiating with a Buy rating and \$530 price target (17.1x PE on F24E), a 7% premium to DE's trailing 5-year average forward PE multiple of 16x.

John Deere (DE: NYSE) operates across four business segments, **Production and Precision Agriculture, Small Agriculture and Turf, Construction and Forestry, and Financial Services**. The products and services from these segments are primarily marketed through independent retail dealer networks and major retail outlets. However, roadbuilding products in certain markets outside the U.S. and Canada are marketed through the company's sales and service subsidiaries.

Our estimates and price target reflect tempered near-term growth with valuation upside

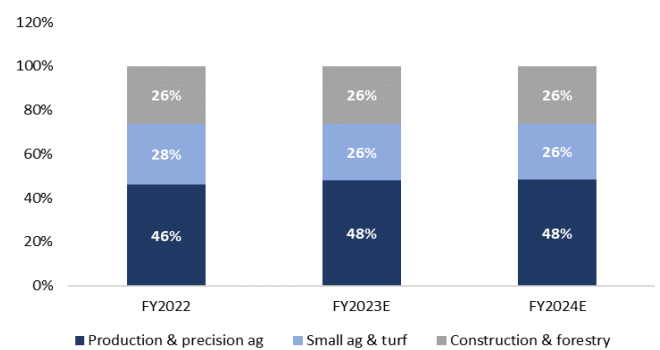
In FQ3 and the full year fiscal 2023, our model calls for 3% and 12% YoY total sales growth, reaching \$14,591 million and \$58,900 million, respectively. We anticipate fiscal 2023 growth will be fueled by 14% and 15% YoY increase in the Agriculture and Turf and Construction & forestry segments, reaching \$40,424 million and \$14,417 million, respectively. Within the Agriculture and Turf segment, we anticipate Production and Precision Ag to grow at ~20% YoY, to \$26,382 million, and Small Ag and Turf to increase by ~5% YoY, to \$14,042 million. Turning to fiscal 2024, we expect total revenue to decline 1% to \$58,090 million, primarily due to the lag effect of declining farmer gross income projected for 2023. We expect consolidated net income in fiscal 2023 and 2024 to come in at \$9,386 million and \$9,219 million, respectively.

Figure 17: Revenue forecast



Source: Company reports, Canaccord Genuity estimates

Figure 18: Revenue segments as a % of sales forecast



Source: Company reports, Canaccord Genuity estimates

Current valuation discount offers upside

P/E valuation method

Our \$530 price target represents a 7% premium to DE's trailing 5-year average forward P/E multiple of 16x. We see upside for the stock based on a current moderately discounted P/E of 13.2x versus the five-year average of 16x, which considers a likely flattening for growth next year.

Figure 19: DCF (US\$M)

Implied Share Price	
	Perp. Growth
Present Value of Cash Flow s	\$81,831
Present Value of Terminal Value	\$127,491
Enterprise Value	\$209,322
Plus: Cash & Cash Equivalents	6,123
Less: Non-Controlling Interest	(102)
Less: Debt	(58,099)
Equity Value	\$157,244
Diluted Shares Outstanding	296.5
Implied Share Price	\$530.33

Source: Company reports, Canaccord Genuity estimates

DCF method

Our \$530.33 implied share price is based on an ~3% revenue CAGR FY'22-32E, an 8% WACC, and a 2% terminal growth rate. Additionally, we are utilizing FQ2 2023 balance sheet values for cash of \$6.1 billion, debt of \$58 billion (short-term borrowings of \$17,109 million, short-term securitization borrowings of \$5,379 million, and long-term borrowing of \$35,611 million), and \$102 million in non-controlling interest.

Comparable company valuation analysis

When looking at broadline Ag equipment/precision Ag peers, the company trades at a 63% premium on a 2024E EV/sales basis (3x vs. 1.8x) and in line in terms of 2024E P/E multiple (13.2x vs 13.2x). We note that DE appears poised to deliver superior growth versus peers at a projected 2022-2024E EPS CAGR of 15% vs. 11% for peers.

Figure 20: Competitive analysis

Ticker	Stock Price	Mkt. Cap.	TEV	2023E			2024E					2YR CAGR ('22-'24)		
				EV/Revenue	P/E	Revenue Growth	EV/Revenue	P/E	PEG	Revenue Growth	EPS Growth	Revenue CAGR	EPS CAGR	
														\$
Deere & Company	DE	\$409.51	\$121,420	\$173,396	2.9x	13.0x	12%	3.0x	13.2x	2.6	(1%)	(1.8%)	5%	15%
AGCO	AGCO-US	\$132.56	\$9,924	\$11,432	0.8x	9.1x	15%	0.8x	9.0x	1.2	1%	0.4%	8%	9%
Caterpillar	CAT-US	\$240.69	\$124,041	\$153,342	2.3x	13.4x	10%	2.3x	13.1x	2.3	1%	2.2%	6%	15%
CNH Industrial	CNHI-US	\$14.19	\$19,010	\$38,988	1.6x	8.2x	3%	1.6x	7.8x	4.4	1%	4.6%	2%	12%
Kubota Corp	KUBTY-US	\$72.57	\$17,260	\$31,129	1.5x	12.8x	5%	1.5x	13.1x	5.6	0%	(2.5%)	2%	7%
Mahindra	500520-IN	₹ 1,400.45	₹ 1,741,501.60	₹ 2,329,349.51	2.4x	19.2x	15%	2.2x	17.1x	1.4	10%	12.6%	13%	14%
PACCAR	PCAR-US	\$80.36	\$41,994	\$47,405	1.5x	10.2x	16%	1.7x	12.6x	5.6	(10%)	(19.5%)	2%	5%
Terex	TEX-US	\$58.73	\$3,982	\$4,438	0.9x	9.8x	12%	0.9x	9.6x	1.6	0%	1.2%	6%	19%
Trimble	TRMB-US	\$51.67	\$12,801	\$13,735	3.5x	19.8x	5%	3.3x	17.7x	3.0	7%	11.8%	6%	5%
The Toro Company	TTC-US	\$100.35	\$10,427	\$11,269	2.3x	21.0x	7%	2.2x	18.9x	3.1	5%	10.8%	6%	12%
				Mean:	1.9x	13.7x	10%	1.8x	13.2x	3.1	2%	2%	6%	11%
				Median:	1.6x	12.8x	10%	1.7x	13.1x	3.0	1%	2%	6%	12%

Source: Company reports, Canaccord Genuity estimates

Management outlook for 2023

Industry view

In the **Agriculture and Turf** industry, sales of large agricultural machinery in the U.S. and Canada are projected to increase by ~10% compared to 2022, according to John Deere. However, sales of small agricultural and turf equipment in the same region are expected to decrease by ~ 5%. In Europe, sales of agricultural machinery are forecasted to stay flat or increase by up to 5%, while in South America, sales of tractors and combines are predicted to be flat. However, in Asia, sales are anticipated to decline moderately in 2023 due to stabilized demand in India, which is the largest tractor market globally.

For the **Construction** and **Forestry** industry, sales of construction equipment and compact construction equipment in North America are expected to remain flat or increase by up to 5% in 2023. Global sales in the forestry and roadbuilding sectors are projected to remain flat.

Figure 21: Industry outlook for fiscal 2023

Agriculture & Turf	
<i>U.S. & Canada:</i>	
Large Ag	Up ~ 10%
Small Ag & Turf	Down ~ 5%
Europe	Flat to Up 5%
South America (Tractors & Combines)	Flat
Asia	Down moderately
Construction & Forestry	
<i>U.S. & Canada:</i>	
Construction Equipment	Flat to Up 5%
Compact Construction Equipment	Flat to Up 5%
Global Forestry	Flat
Global Roadbuilding	Flat

Source: Company reports, Canaccord Genuity Research

Business segment view

For the Production and Precision Ag segment, the company expects net sales to increase by up to approximately 20% YoY, with price realization contributing 15% to the projected growth. Sales in the Small Ag and Turf segment are projected to grow by up to approximately 5% YoY, with price realization boosting sales by 9%, offset by a negative impact from currency translation. Finally, sales in the Construction and Forestry segment are anticipated to increase by up to approximately 15% YoY, with price realization accounting for 10% of the sales growth.

For Financial Services, DE expects net income to be \$630 million, lower than fiscal year 2022. This decline in net income can be attributed to several factors, including less favorable financing spreads, the correction of accounting treatment for financing incentives provided to John Deere dealers, negative valuation adjustments in the derivative market, a higher provision for credit losses, increased selling, administrative, and general expenses, and reduced gains on operating-lease dispositions.

Figure 22: Company segment outlook

	Net Sales	Currency Translation	Price Realization
Production & Precision Ag	Up ~ 20%	0%	15%
Small Ag & Turf	Up ~ 5%	-1%	9%
Construction & Forestry	Up ~ 15%	0%	10%

Financial Services	Net Income \$630 million
---------------------------	---------------------------------

Source: Company reports, Canaccord Genuity Research

Consolidated outlook

Looking ahead to 2023, net income attributable to Deere & Company is forecasted to be in a range of \$9.25-\$9.50 billion. Cost of sales as a percentage of equipment net sales is anticipated to be approximately 68%, SG&A expense is forecasted to increase ~17% YoY, while R&D expense will grow by ~14% YoY. Capital expenditures is expected to total approximately \$1.5 billion, and pension/OPEB expenses are anticipated to decrease by ~\$190 million, while pension/OPEB contributions are expected to amount to ~\$200 million.

Fiscal Q2 2023 recap

In the second quarter of 2023, total sales increased by 30% YoY to \$17.4 billion, while product net sales came in at \$16.1 billion for the quarter. **Production and Precision Agriculture** sales saw a significant YoY growth of 53%, to \$7.8 billion, driven by higher shipment volumes and price realization. The operating profit for this segment experienced a remarkable 105% YoY increase, reaching \$2.2 billion, or

a margin of 27.7%. The strong growth in operating profit can be attributed to price realization and improved shipment volumes.

The **Small Ag and Turf** segment achieved a YoY revenue growth of 16%, totaling \$4.1 billion for the quarter. This increase was primarily driven by price realization and higher shipment volumes, partially offset by the negative impact of foreign currency translation. The operating profit for this segment grew by 63% YoY to \$849 million, with a margin of 20.5%. The growth in operating profit was a result of price realization and improved shipment volumes/mix.

The **Construction and Forestry** segment also experienced substantial YoY growth of 23%, reaching \$4.1 billion for the quarter. This growth was mainly driven by price realization and higher shipment volumes. The operating profit for this segment increased by 3% YoY to \$838 million, with a margin of 20.4%. The growth in operating profit was due to price realization and improved shipment volumes/mix.

In contrast, **Financial Services** net income declined by 87% YoY to \$28 million, primarily due to less favorable financing spreads and a higher provision for credit losses. Additionally, a \$135 million after-tax correction in the accounting treatment for financing incentives offered to John Deere dealers, which affected the timing of expense recognition, impacted the net income for the quarter.

The company's net income was \$2.86 billion, or \$9.65 per share, compared to \$2.098 billion, or \$6.81 per share, for the same quarter last year.

AgTech through the sustainability lens

To better understand CTV's and DE's growth opportunity, it is important to look at agriculture's broader sustainability role. Let's start with a review of the environmental challenges facing the food system. As mentioned in this report's introduction, the world is facing significant environmental challenges likely to grow more acute in the coming decades. These include maintaining food security in the face of growing populations and a growing middle class in the developing world, the loss of farmable land, and global warming. Taken together, these escalating food and environmental challenges require producing more with fewer resources and less collateral damage. Additional details follow.

Many more mouths to feed

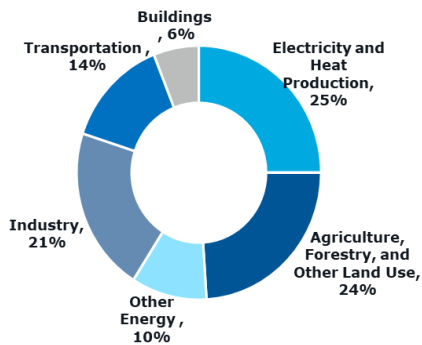
The global population hit 7.5 billion in 2018, an increase of 2 billion in roughly 25 years. Even with lower birth rates, this climb is expected to continue due to advances in human health. An increase in average life span, especially in developing countries, is more than offsetting declining births from family planning. In 2015, global life expectancy rose to 71.4 years, a roughly five-year increase from 2000.

Even if birth rates were to decline to mere replacement levels, the global population would continue to grow due to the increasing number of people surviving to reproductive age and beyond. Given this substantial positive momentum, mainstream forecasts have the population reaching 8.5 billion in 2030, 9.7 billion in 2050, and 11.2 billion in 2100. With global population growth, demand for food is rapidly increasing. It's estimated the world will need to grow 50% more food by 2050 to feed those 9.7 billion people. If the goal is to provide a baseline of nutrition, food production must increase 70% by 2050, according to the Food and Agriculture Organization of the United Nations (FAO).

The rising global middle class is tending carnivorous

Shifting consumption habits could exacerbate food security concerns and environmental impact. Animal husbandry is a major cause of the decline in available farmland, and livestock use considerably more water and land resources than plant cultivation. Dietary trends in the developing world could drive a rise in animal

Figure 23: GHG contribution



Source: Canaccord Genuity Research, IPCC (2014)

It's estimated the world will need to grow **50%** more food by 2050, when the population is projected to reach **9.7 billion** people.

agriculture, as a growing middle class in emerging economies fuels an increase in the consumption of meat. China is a harbinger of what can be expected for dietary trends in the broader developing world. Driven by rising incomes, China's average annual meat consumption per person grew by almost five times since the early 1980s. Over the same period, China's population grew roughly 40%. Per-capita meat consumption is expected to increase in many parts of the developing world. According to the United Nations' Food and Agriculture Organization (FAO), while the consumption of meat is expected to rise roughly 10% globally from 2015 to 2030, the increase in the developing world (ex-China) is expected to be close to 25%. As mentioned, the environmental impact of meat production is substantially higher than for plants. According to the FAO, animal agriculture is responsible for nearly 20% of all greenhouse gas emissions from human activities, roughly two-thirds of agriculture's total GHG contribution. While only 30% of the world's surface is made up of dry land (including land covered by ice), roughly a third of this area is dedicated to the keeping of livestock.

In just the past 40 years, more than **one-third** of global arable land has disappeared due to erosion and pollution.

Losing the farm

Loss of farmable land is perhaps the most acute problem facing agriculture and the world's ability to feed its growing population. In just the past 40 years, more than one-third of global arable land has disappeared due to erosion and pollution. Current farming practices own a significant share of the blame. Soils have degraded through the heavy use of fertilizers and continual plowing. Planting and harvesting erode soil's structure through exposure to oxygen, compromising its ability to store water and retain nutrients. Soil erosion is occurring at a rate over fifty times the pace of soil formation.

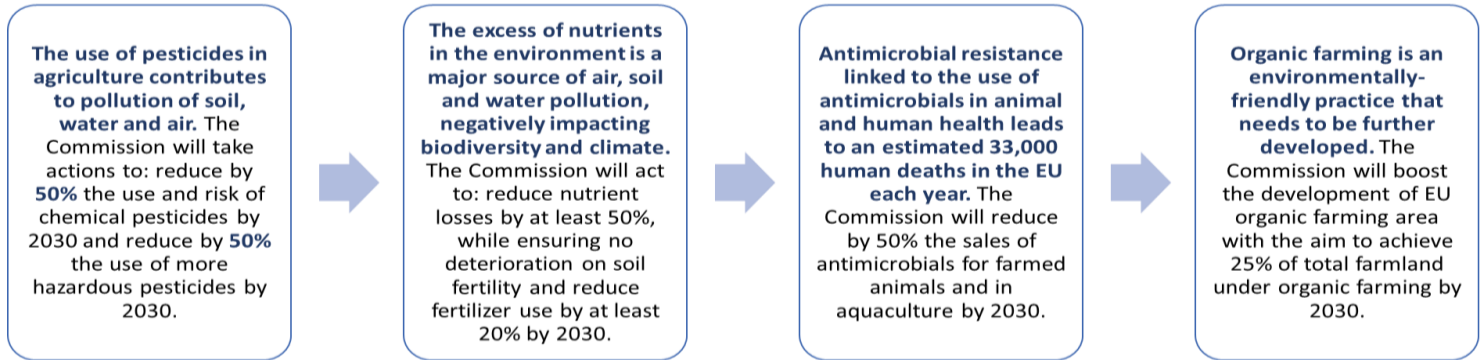
Governmental, corporate, and consumer-driven change

Corteva and Deere operate within an Ag and food system in transition toward environmentally sustainable practices and technologies. Additional stakeholders driving change are varied and include regulators, large food CPG players, and consumers. We highlight some of their key activities below.

Within the EU: Farm to Fork

In recent years, the EU has made significant strides toward achieving sustainable food production with particular emphasis on reducing the use of synthetic agricultural chemicals. The EU proposed its Farm to Fork (F2F) strategy in May 2020, as the agricultural component of the European Green Deal, which aims to make the continent carbon neutral by 2050. F2F restricts agriculture in the EU in several targeted areas, including land use, fertilizers, pesticides, and antimicrobials. As the EU implements F2F, it is focused on reducing synthetic pesticide and fertilizer use by 50% and 20%, respectively. In June of 2022, the EU proposed increased usage of integrated pest management practices and biologicals as means for reaching these targets (within seven years for the pesticide reduction).

Figure 24: Farm-to-fork strategies



Source: European Commission, Canaccord Genuity Research

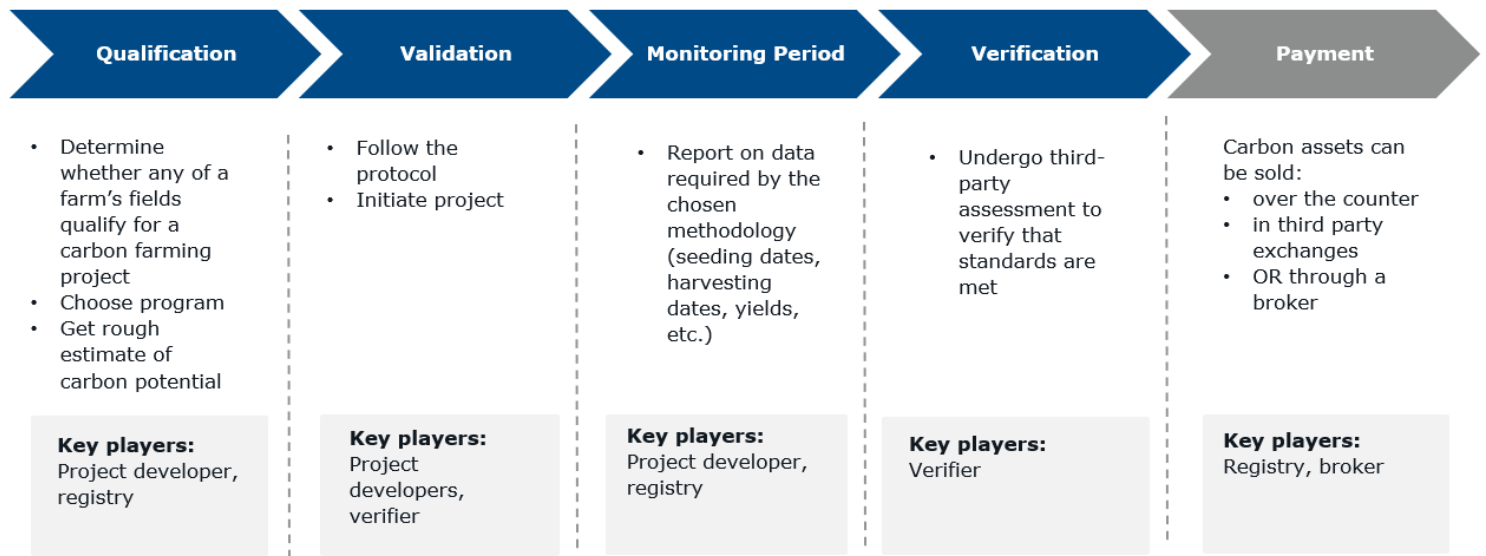
Major US effort: The Inflation Reduction Act

The IRA was signed into law by President Joe Biden last August, and it is expected to have a significant impact on sustainable agriculture in the US. This legislation has provided substantial financial incentives for agriculture, forestry, and rural development, with almost \$40 billion allocated for these purposes. Approximately half of this amount (\$19.5 billion) has been dedicated to agriculture conservation, aimed at providing direct climate mitigation benefits and expanding access to financial and technical assistance for growers and livestock producers. Through this initiative, farmers and ranchers can utilize practices like cover cropping, conservation tillage, wetland restoration, prescribed grazing, nutrient management, and tree planting to advance conservation on their farm, ranch or forest land and help reduce greenhouse gas emissions, mitigate the effects of climate change and promote environmental stewardship. Overall, the IRA's allocation of \$19.5 billion toward agriculture conservation is a significant investment in the future of sustainable agriculture, with the potential to provide substantial benefits for both producers and the environment.

CPG cleaning up supply chains aligns with emerging private Ag carbon markets

Large corporate players in food across CPG and retail are establishing goals to reduce greenhouse gas emissions that incorporate regenerative agriculture. Announced in 2021, PepsiCo aims to transition to regenerative agricultural practices for 7 million acres of farmland in its supply chain by 2030, while General Mills has targeted 1 million regenerative acres by the same year. Walmart has set a goal to become regenerative by 2040, a significant development simply for the fact that it is the world's largest food and agriculture corporate player. Unilever's Regenerative Agriculture Principles are focused on mitigating the climate impact of the roughly 10m acres of land required to generate its products. Against this backdrop, a broadening assortment of private carbon marketplaces has emerged within agriculture. As the use of biologicals to reduce or eliminate the heavy application of synthetic chemical inputs is a key component of transitioning to and maintaining regenerative practices, we have highlighted several processes common to carbon credit programs below.

Figure 25: Processes common to carbon credit programs



Source: Canaccord Genuity Research: "What cotton growers should ask--and why--when it comes to carbon," Cotton Incorporated, National Cotton Council of America

Food retailers are also exerting pressure

While branded food CPG behemoths like General Mills and PepsiCo are taking steps to shift toward more sustainable supply chains, their retailer customers are beginning their own transitions, albeit slowly. Large food retailers have begun to make commitments to reduce pesticide use upstream in their supply chains. Results vary so far, with only Giant Eagle and Walmart placing deadlines on implementing the changes. Giant Eagle vowed to bar use of a specific neonicotinoid harmful to bee populations, and both companies are requiring their suppliers of fresh produce to implement third-party verified integrated pest management practices by 2025.

Other notable retailers are encouraging the reduction of synthetic pesticide by their suppliers, but with fewer specific metrics to track implementation. These include Albertsons, Aldi, Costco, CVS, Dollar Tree, Kroger, Meijer, Rite Aid, Southeastern Grocers and Target, and the main chemistries to be reduced are glyphosate, neonicotinoids, and organophosphates.

Corporate changes reflect consumer preferences

While dietary trends in emerging economies pose a challenge as they incorporate more meat, consumers in the developed world are exhibiting a preference for sustainably produced food. Consumers have grown increasingly aware of environmental damage caused by intensive agricultural practices and animal agriculture. Their advocacy at the register offers incremental margin to farmers that effectively adopt precision Ag technologies and reduce of synthetic chemical use.

Ag & food's ESG role shouldn't be overlooked

As the agriculture and food system's impact on the environment becomes more widely understood, the sector is gaining prominence on the impact investing agenda. Suitable areas of ESG (Environmental, Social and Governance) investment in agriculture and food could include genetically engineered crops requiring less water and fewer protection inputs, precision farming practices that preserve the quality of the soil and more efficiently allocate resources, and innovations to accelerate consumer protein diversification away from animal sources. We also view technologies that reduce food waste as fitting well with an ESG investment framework. Going forward, Ag and food are likely to gain additional interest across a broadening range of ESG investment classes, helping to bolster funding for innovation within the sector that is focused on sustainability.

Figure 26: Friends of the Earth report card

Retailer	Grade	Points
Giant Eagle	B	102
Walmart	B-	94
Whole Foods Market	B-	88
Costco	C+	75.5
CVS	D+	51.5
Aldi (US)	D+	47.5
Trader Joe's	D+	47
Meijer	D	44.5
Dollar Tree	D	43
Rite Aid	D	41
Southeastern Grocers	D	38
Albertsons	D	36
Target	D-	33

Source: Friends of the Earth, Canaccord Genuity Research

AgTech companies are the prime actors meeting sustainability challenges

We expect greater adoption of precision Ag and biologics to be driven by the above regulatory and customer-driven pressures, with growth for these markets offering proxies for Deere and Corteva's respective longer-term opportunities.

Increasingly favorable regulatory treatment for advanced seed trait technology

Older, transgenic (transfer of gene from one species to another) approaches involving the introduction of foreign DNA are tightly regulated in the US and Europe, leading to considerable costs for companies trying to market transgenic products. However, while the rules surrounding the regulation of CRISPR-edited crops are still in flux, the US thus far has taken a less strict regulatory approach.

In 2018, the USDA issued a statement from Secretary of Agriculture Sonny Perdue clarifying its position on CRISPR use: it will not "over-regulate" the use of the technology in the sector. A review of the USDA's Animal and Plant Health Inspection Service website shows a significant number of crop technologies that have been cleared by the regulatory body, including those from Calyxt (wheat/TALEN technology), Benson Hill (corn), DuPont Pioneer (corn), Yield10 (genome-edited Camelina plant), Agrivida (corn variety known as PY203), and a more recent safety approval from APHIS granted to Bayer CropScience for its modified corn plant with reduced gibberellic acid.

More recently, in May 2023, the Canadian federal agriculture minister, Marie-Claude Bibeau, announced guidance for gene-edited crops in Canada. The approach involves strengthening the Seeds Canada database to include all Canadian seed varieties and their production methods, making it publicly accessible. The goal is to facilitate discussions and provide reliable information as gene-edited products enter the market. Bibeau also stated that the government will provide financial support for the review of Canada's organic standards in 2025. The guidance was delayed due to concerns raised by organic producers who oppose gene editing and expressed worries about potential market impacts. These measures aim to support sustainable agriculture production while meeting the transparency requirements of the organic sector.

Additionally, China has recently granted its first approval for a gene-edited crop, a soybean developed by Shandong Shunfeng Biotechnology. The soybean contains two modified genes that increase the level of healthy fat oleic acid. Unlike genetically modified organisms (GMOs), gene editing modifies existing genes and is considered less risky. The approval is valid for five years and marks a significant milestone for Shunfeng, which aims to commercialize gene-edited crops. The company is also researching other gene-edited crops, including high-yield rice, wheat, and corn. While further approvals are required before planting the soybean, gene-edited crops are expected to undergo a faster regulatory process compared to GMOs. China's approval comes as the country seeks solutions to trade tensions, weather challenges, and the rising demand for food.

In 2021, the European Commission has initiated a review of EU regulations regarding GMOs, potentially leading to relaxed restrictions on plants produced through gene-editing technology. The review was prompted by a 2018 ruling from the European Union's top court, which stated that genome-altering techniques should be governed by existing GMO rules. The Commission determined that its 2001 legislation was inadequate for this purpose. While concerns persist about the environmental impact, safety, and labeling of gene-edited crops, the biotech industry argues that such techniques merely accelerate natural processes and that GMO-style regulations hinder sustainable crop development and research into human diseases. A Commission study recognized the potential of new genomic techniques to contribute to sustainable food production while acknowledging the need to address safety concerns. Some EU member states, such as France, have expressed support for treating gene-editing differently from GMOs. The industry

calls for swift implementation of differentiated rules for gene-editing, while environmental groups like Friends of the Earth and Greenpeace oppose separate treatment, arguing that GMOs and gene-edited crops are fundamentally similar.

The EPA, which regulates the sale, distribution and use of pesticides in the US for both safety of consumers and the environment, has approved multiple plant incorporated protectants (PIPS) which utilize RNA Interference (RNAi). These pesticides are regulated like all traditional pesticides in the US. PIPS are pesticides that plants can produce following gene modification. The first RNAi-based PIP was approved in March 2017 and targeted the western corn rootworm.

Agricultural Biotechnology primer

Figure 27: Ag Biotech



Source: Trace Genomics reports

An overview of Ag Biotech’s key innovations and sustainability contribution provides context for CTVA’s opportunity. Generally speaking, agricultural biotechnology encompasses methods or tools that alter living plants or animals in pursuit of their improvement as products, including the utilization of microbes for agricultural purposes. Emerging technologies within Ag biotech address a broad range of activities directed at crop modification and the development of agricultural inputs. Potential benefits from advancements in agricultural biotechnology include the ability to generate substantially higher crop yields, lower the use of chemical inputs, and convey less ancillary damage to the environment. In this brief overview, we cover innovations in crop breeding technologies including GMO and gene-edited plant traits, as well as biological versions of crop protection and crop nutrition products (some of which may involve engineered microbes).

Figure 28: Plant breeding



Source: Trace Genomics reports

Plant breeding has deep roots

In traditional breeding, the manipulation of plants and animals was achieved by selecting parents in order to enhance or deemphasize certain characteristics. Over time, this led to vastly changed crop and livestock varieties, now largely unrecognizable when compared to the wild plants and animals of their origin. Traditional breeding improved and was augmented over time through selective cross breeding, cross pollination, grafting, and other methods. But it wasn’t until the discovery of induced mutation (artificial mutagenesis through chemicals or other physical agents) that significantly rapid advances could be made.

Green shoots of more sophisticated DNA manipulation

Although the structure and mechanisms of DNA were not yet well understood, plant breeders began to induce mutations chemically or otherwise to increase genetic variation in crops at a much higher frequency than occurs naturally. Thousands of crops varieties have been developed in this manner, although the process was time consuming and inefficient. With greater understanding of genetics, new techniques were introduced and the yield gains of the Green Revolution (widespread use of chemical fertilizers, pesticides, and control irrigation) were enhanced and extended by the techniques behind GMO food crops.

Figure 29: Seed breeding technologies

	Hybridization	Chemical or physical mutagenesis	Transgenesis	Cisgenesis	Genome editing
Method of gene transfer/modification	Controlled crossing	Exposure to chemical or physical agents	Gene transfer, mainly through <i>Agrobacterium tumefaciens</i> (T-DNA integration) and biolistic method	Gene transfer, mainly through <i>Agrobacterium tumefaciens</i> (T-DNA integration) and biolistic method	Gene modification, mainly through <i>Agrobacterium tumefaciens</i> (T-DNA integration) and ribonucleoproteins (RNPs)
Origin of the genes introduced or modified	Plant of the same species or a crossable species	Plant itself (endogenous genes)	Any organism	Plant of the same species or a crossable species	Plant itself (endogenous genes)
Targeted vs random approach	Parent choice is targeted, the genetic mixing is random. The desired introgression is identified in a selection process	The mechanism is untargeted. The desired mutation is identified in a selection process	Gene of interest (GoI) is integrated in the plant genome untargeted	GoI is integrated in the plant genome untargeted	The nuclease cleavage is targeted while the T-DNA integration is untargeted
Selectable marker genes	No	No	Yes	SMG can be used but must be removed	SMG must be removed
Involvement of genes other than GoI	Yes	Possible	Low risk	Low risk	Low risk
Possibility to distinguish from a natural occurrence	No	No	Yes	Yes	No (if the T-DNA is completely removed)
Time-consuming drawbacks	Several time-consuming backcrossings potentially needed	Mutation type and stability must be controlled over several years	Plants must undergo approval procedures	Plants approval procedures are to be defined in EU and other countries	Plants approval procedures are to be defined in EU and other countries

Source: www.nature.com, Canaccord Genuity Research

New genetic breeding tech is departure from GMO

Common usage of the term GMO refers to crops produced through transgenic modifications, or the repurposing of DNA across the species or kingdom barrier. In an important distinction for regulators and consumer groups alike, GMOs are also crops whose modifications are considered unable to have occurred through traditional breeding or natural selection. With NPBTs, genomes are altered largely with intraspecies DNA or gene expression is manipulated through RNAi or other means. Typical methods of transgene insertion for GMO development include the gene gun (bombarding target cells with nano pellets coated with transgene fragments) and DNA transfer with *Agrobacterium tumefaciens* (utilizing the natural DNA transfer mechanism of the disarmed disease-causing bacteria).

Regulatory burden and high costs limited variety of GMO crops

GMOs are highly regulated, and this heavy regulation has translated into high development costs and a slow time to market. According to Crop Life International, the average time it takes to conduct research and complete the regulatory steps necessary prior to going to market is 13 years. As of 2011, the average cost was \$136M, according to a study conducted for Crop Life International, with that same study identifying regulatory science and registration costs at over 25% of the total. One effect of these burdens has been to discourage innovation beyond staple crops like corn, wheat, soybeans, and rice, ignoring potential benefits for specialty crops. The high cost and slow time to market also bars smaller companies from pursuing GMO development in earnest. Perhaps a less obvious cost has been the association of heavy regulation with danger, which may have contributed to public perception that GMOs carry proportionately higher risks.

Roughly **85-95%** of soybeans and corn are GM today, and alfalfa and potato are expected to see strong growth along.

Even with these headwinds, the impact of GMO crops has been massive. Roughly 85-95% of soybeans and corn are GM today, and alfalfa and potato are expected to see strong growth along. In some ways, GMO crops can be viewed as an extension of the Green Revolution’s ability to deliver increased agricultural productivity in the face of resource constraints and a growing world population.

GMO crops have been modified to repel pests, enhance nutrient uptake, and require less water. As a result, GMOs not only often have substantially lower input costs and meaningfully higher yields than their non-GMO varieties (also good for farmers' bottom lines) but offer considerable environmental benefits as well.

The GMO paradox: an unwanted potential windfall for consumers and the environment

One irony apparent when examining the history of anti-GMO advocacy is the disregard paid to many environmental benefits of GMO crops. Among other improvements, GMO crops have been modified to repel pests, enhance nutrient uptake, and require less water. As a result, GMOs not only often have substantially lower input costs and meaningfully higher yields than their non-GMO varieties (also good for farmers' bottom lines) but offer considerable environmental benefits as well. GMOs check many of the sustainability boxes: lower tillage and water use for less loss of precious soil and water resources, meaningfully higher yields for sufficient production on limited footprint, decreased chemical use for less pollution to the environment and safer food consumption, as well as lower cost of food for consumers.

Of course, there are downsides to the present state of GMO food crops market, most notably in terms of herbicide resistance and harm to off-target insects. Other negatives include concentration of profits in the hands of a few powerful corporations, and potential conflicts of interest between seed and chemical interests within the same corporate entities.

Nevertheless, the trait enhancements made in GMOs appear to solve many prominent consumer concerns with respect to the food they eat. According to a 2018 survey by IFIC (International Food Information Council), "food values" as a decision-making constituent is increasingly important for shoppers when choosing foods and beverages. Consumers' positive estimation of a food product's healthfulness was substantially influenced by its use of environmentally sustainable production practices (reducing pesticides was the top perceived determinant of health). In the same survey, however, lack of GMO ingredients was cited by consumers as another important factor influencing purchase decisions.

It appears that environmental sustainability, health and non-GMO have become conflated in the minds of consumers. It follows that, anti-competitive behavior aside, and despite documented environmental, health, and cost benefits, GMOs have a PR problem that appears to be getting worse. A slew of NGOs are dedicated to their limitation or eradication, fed by constant negative messaging consumers are increasingly anti-GMO, and US regulatory authorities have mandated explicit GMO labelling reinforcing that perception.

NPBTs: breeding by other names

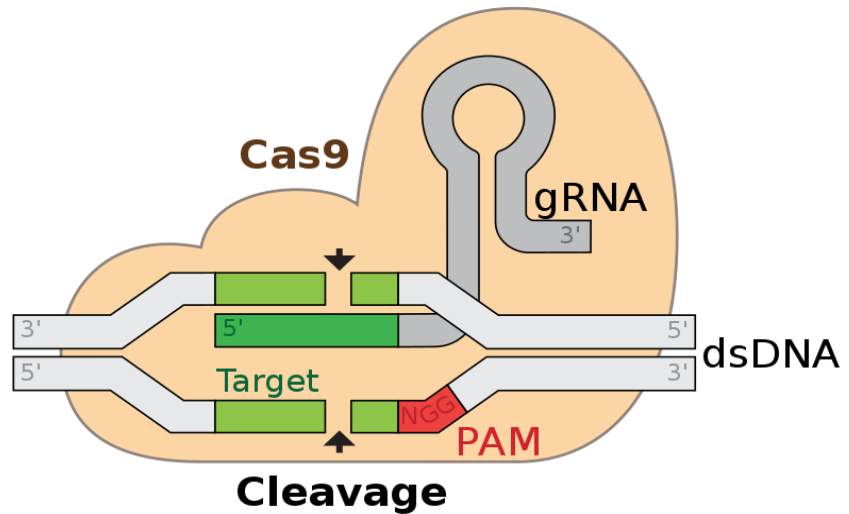
Perhaps the world's greatest hope for achieving environmentally sustainable agriculture sufficient to feed future populations (if we exclude GMOs), can be found in NPBTs. These include CRISPR, RNAi, TALEN, ZFN, among other methods, and their potential crops promise meaningfully higher yields, greater efficiencies, and less collateral environmental damage when compared to existing crops. Notwithstanding a degree of control that borders on science fiction (especially with CRISPR), NPBTs can be viewed as the latest step in the long evolution of plant breeding techniques begun thousands of years ago.

CRISPR offers substantial promise for improvement of broad range of crops

Adapted from the antiviral defense system of bacteria, CRISPR (Clustered Regulatory Interspaced Short Palindromic Repeats) is a robust gene editing tool, allowing accurate modification of genetic function in a wide range of species by applying "molecular scissors" (typically Cas9 enzyme) to sequences of DNA. CRISPR are stretches of DNA found in bacteria and archaea that, along with Cas9 and other proteins, are used to fend off viruses and other invaders by destroying their DNA. Researchers have harnessed this process for precise genetic editing by using RNA as a guide and Cas9 to make the cuts. After the cut, a DNA template can be supplied for the natural repair process, filling in the gap with a desired sequence of nucleotides that effectively writes-in a gene of choice.

Importantly, and unlike GMOs, CRISPR doesn't rely on introducing "foreign" DNA from bacteria or viruses for desired changes to a plant's traits. By avoiding transgenics, CRISPR-modified plants can be viewed as utilizing natural processes, delivering desired traits also possible through selective breeding or eventually by natural selection. CRISPR is also much faster, more accurate, and less costly than crop modification through transgenic GMO processes, as well as more effective than other gene editing techniques such as ZFNs and TALENs.

Figure 30: CRISPR



Source: Source: Marius Walter / Wikimedia Commons / Public Domain

Biologicals: crop protection/nutrition subcategory of Ag Biotech

Figure 31: Biologicals



Source: Verde AgriTech reports

Figure 32: Biologicals



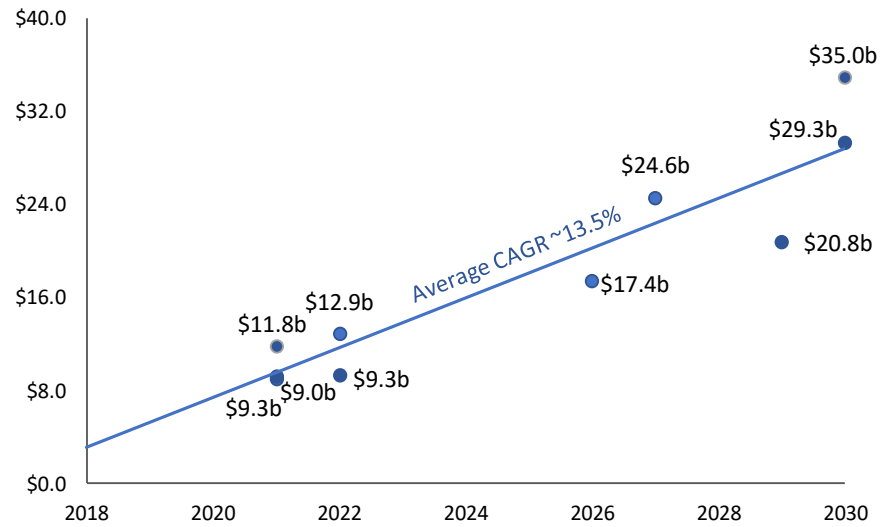
Source: Verde AgriTech reports

While commercial biological products for crop protection and nutrition have existed for decades, a multitude of drivers are promoting broader adoption. On the demand front, farmers have become more focused on preserving the quality of their soils while mitigating the rising costs of inputs and improving their bottom lines. Meanwhile, the end customers (major food brands and retailers, consumers, etc.) want more sustainably sourced crops, view synthetic chemicals with increasing suspicion and aversion, and are often willing to pay a premium for environmentally friendly practices. The emergence of a substantial carbon farming ecosystem, onerous synthetic chemical regulations, and a prohibitively expensive and time-consuming process for bringing new synthetic chemistries to market are also fueling greater demand for biologicals.

Biologicals are positioned for strong growth

We believe the long-term annual growth rate for biologicals market to be more than 2x that of the conventional crop protection and fertilizer markets. A survey of market size estimates through the end of this decade reveals growth expectations averaging slightly above 13%, well north of low- to mid-single digits seen for conventional products. This conforms to views expressed by agrichemical incumbents including Corteva, which sees the share of biological crop protection reaching 20-25% by 2035 (CG currently estimates biopesticides at roughly 5% of total crop protection market). Within crop protection, much of the sector's growth is likely to come from gains in row crops and herbicides, while biofertilizers are also likely to make significant strides in adoption.

Figure 33: Biologicals TAM and growth

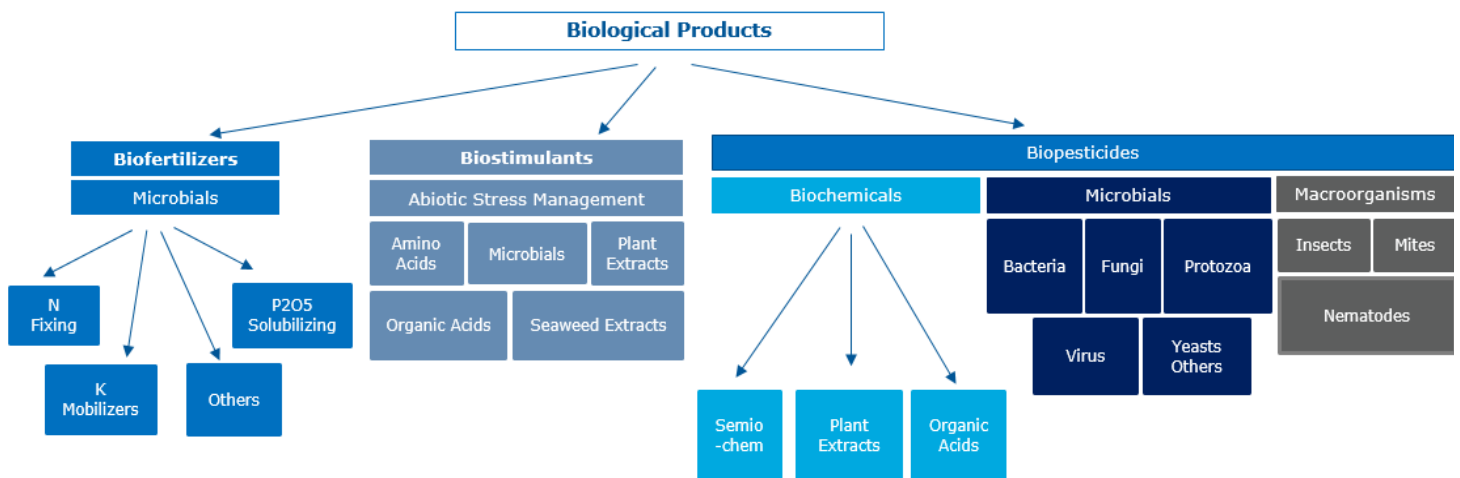


Source: Canaccord Genuity Research, Spherical Insights & Consulting, Markets and Markets, Acumen Research and Consulting, ResearchAndMarkets.com, Meticulous Research

Natural by definition

Biologicals are products for crop protection or crop production that utilize natural sources for their ingredients, such as microbes (bacteria, fungi, yeast, and others), plant extracts, beneficial insects (macroorganisms), and even proteins and peptides. Derived from living organisms, they were the first and only inputs available to farmers for millennia, although the processes behind their effectiveness (their modes of action) were poorly understood. Today, biologicals can be placed into the three broad categories of biopesticides, biostimulants, and biofertilizers. Biopesticides currently represent the largest portion of the biologicals market, followed closely by biostimulants.

Figure 34: Biological products breakdown



Source: Dunham Trimmer LLC, Canaccord Genuity Research

Biologicals offer sustainable alternatives to synthetic chemicals

Within sustainable agriculture, biologicals provide an indispensable tool. They reduce the amount of synthetic chemicals applied to crops either through complete substitution or by their role in an integrated pest management program bringing

together several sustainability practices. They promote microbial diversity in the soil and improve soil's "carbon sink" potential. The regenerative agricultural practices supported by biologicals not only improve soil health, they produce several knock-on benefits. These include lowering input costs, reducing pest resistance, increasing yields, protecting beneficial insects, and potentially generating an additional income stream through carbon credits. Farmer incomes may also benefit from the higher prices that end-customers are often willing to pay for organic and sustainably sourced food.

Rapidly advancing product development

Biologicals pioneer Marrone Bio Innovations (now ProFarm division of Bioceres) provides a useful illustration of a development process for biological products. In search of novel natural chemistries, microbes of interest are first collected and cultured, and undergo a fermentation step as they are prepared for bioassays. Biological testing is then conducted against pests before final identification of pesticidal compounds and prep for manufacturing. To create products with the right cost, efficacy, and ease-of-use profiles, these processes must be optimized, pilot manufacturing commenced along with field trials and registration, and formulations and packaging made user friendly (liquid suspension, wettable powders, granules). IP protections can be established at several points in this process, including patents for the microorganism itself (novel strains, specific uses), for compounds produced by the microorganism and any novel blends or fermented versions, as mixtures with other biologicals or chemical pesticides, and for final product formulations.

While we see several advances in available technologies driving multiple sources of innovation for biologicals, one key technological advancement stands out: the ability to sequence the genomes of plants and microbes at a much lower cost. Other important technological advances include the emergence of new gene-editing and RNA-based technologies, and broader adoption of precision Ag tools.

Figure 35: Biologicals product development



Isolation

Samples from areas of high biodiversity around the world are collected and cultured.



Fermentation

Microbes are grown in liquid commercial-like media
Water extracts of fermentation broths are prepared for bioassays.



Biological testing

Biological testing against weeds, insects, plant pathogens, nematodes, algae, and for growth promotion are performed.
Microbe/genetic ID.



Natural product & analytical chemistry

Identify pesticidal compounds; eliminate harmful strains. Develop analytical assays for mfg QC.

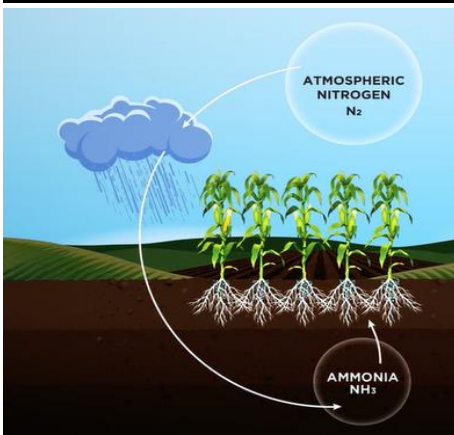
Source: Marrone Bio presentation, BioConsortia, Trace Genomics

Leveraging the soil microbiome

Microbial-based biological solutions remain a principal area of research and product development for the industry. One of the main repositories of microbial diversity, the soil environment is highly complex and contains a broad range of distinct genomes. Myriad agriculturally beneficial microorganisms present in the soil improve soil health and enhance crop yields as they interact with plants and one another. Networks of interactions among plants, their environment, and complex communities of microorganisms profoundly influence plant health and productivity. Similar to our own gut microbiome, interactions between plants, their environment, and a community of soil-based microbes may provide various benefits for crops. These include increased drought and heat tolerance, enhanced nutrient uptake, and greater resistance to pests and disease. In short, microbial activities promote environmentally friendly agriculture by reducing the use of chemical fertilizers and

other toxic compounds, while potentially lowering overall input costs. Many scientists now believe that the benefits of tailoring the microbiotic environment could outstrip the advantages from the genetic engineering of plants.

Figure 36: Nitrogen delivery



Source: Pivot Bio

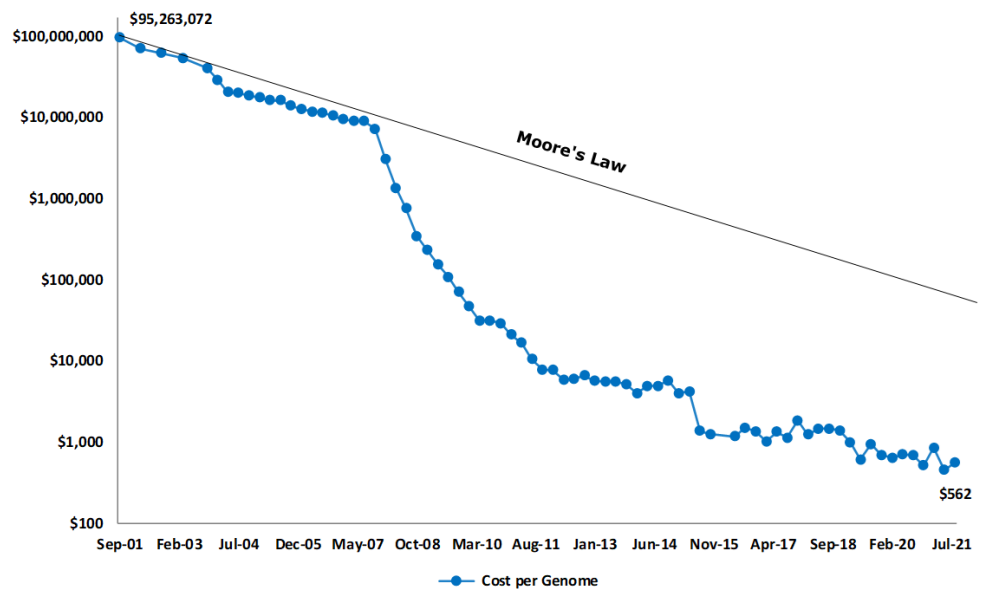
Environmentally sound nutrient uptake with emerging biofertilizers

Not all microbes are created equally, in terms of their nitrogen-fixing capacity at least. Even amongst strong nitrogen fixers, performance can vary based on the cultivar. For instance, different types of maize may have different microbiome bacterial compositions when closely inspected, highlighting the importance of developing microbially-based nutrient solutions that are tailored to specific crops. Strong nitrogen fixers also compete with microbes that flourish near the root structure but are poor at fixing nitrogen. Thanks to mobile genetic elements of plant growth-promoting rhizobacteria (PGPR), by transferring strong nitrogen fixer traits to the less efficient microbes, overall N fixation can be improved. In other approaches, strong nitrogen fixers can also be isolated and delivered more effectively near the root structure without modification.

Lower cost of genome sequencing propelling microbial innovations

Declines in the cost of sequencing a human-sized genome have been driven on two main fronts: advances in Moore’s Law (doubling of compute power every two years), and the transition to “next-generation” sequencing technologies from the earlier Sanger-based method (dideoxy chain termination sequencing). As illustrated in the chart below, genome sequencing costs declined at a pace dictated largely by Moore’s Law until 2008, when the shift to next-gen sequencing tech began to kick in. For the subsequent three or so years, the pace of cost reductions quickened considerably. Non-production costs have declined as well, including bioinformatics and other tools for more efficient management of sequencing pipelines and better analysis and interpretation of results. With the proliferation of these less costly, more advanced tools came substantial progress in plant genome sequencing, joined by genomic investigations into plant-associated microbes. The result is a new era of understanding and application of microbial metabolic pathways that prevent disease or enhance nutrient uptake.

Figure 37: Cost per human genome



Source: Canaccord Genuity Research, National Human Genome Research Institute (NHGRI)

Novel delivery mechanisms for better performance

Biologicals have made significant strides in demonstrable efficacy as they work to overcome a legacy reputation that oftentimes cast them as “snake oil.” While

understanding how microbes and other biologicals interact with crops and soil is fundamental to their development as protection and nutrition products, so is the ability to deliver said active biological ingredient to its target intact and in sufficient quantities. Historically, much of the R&D surrounding biologicals has been concentrated on discovery of plant-beneficial microbes through isolation and selection activities. As we move into an era of molecular Ag biologicals, more attention is being paid to development of appropriate formulation and delivery methods to assure viability of actives at the point of application.

Figure 38: Healthy soil roots



Source: Verde AgriTech

Broad range of tailwinds

A broad range of drivers are fueling demand for biologicals. Major food brands, large retailers, and consumers are voicing heightened sensitivity to the negative environmental effects of industrial agriculture and are focusing much of their means of effecting change on the reduction of conventional pesticide use. As detailed later, biologicals have inherent sustainability advantages over synthetic chemicals including low environmental risk (soil, water, toxicity), and low risk to non-target organisms including beneficial insects. When applied within an integrated pest management program, farmers using biologicals also benefit from reduced pesticide resistance due to their multiple modes of action, in addition to addressing sustainability and health concerns of their customers. Farmers can also potentially gain access to emerging carbon sequestration revenue streams.

Cost is another important driver, as biological pesticides are often substantially less expensive and time consuming to develop than conventional counterparts. The cost consideration has become more critical as regulators ban greater numbers of synthetic chemicals and enact policies that encourage more prevalent biologicals use. Finally, improvements in technologies applied to their development are helping improve biologicals’ efficacy and overall performance to levels on par with and potentially exceeding some conventional crop protection and nutrition solutions.

Lower development costs and faster time to market

Biologicals are much less expensive to bring to market than conventional protection products, with total discovery and development costs of \$10-\$20m compared to >\$300m for their synthetic chemical counterparts, according to Vestaron. Bringing a synthetic chemical protection product to market is also time-consuming, roughly 11+ years compared to 5-7 years for a biological. A large component of rising development costs is the cost of registration, which has risen significantly over the past few decades. According to data from Phillips McDougall, direct registration costs as a share of total product discovery and development costs grew from roughly 6% in 2000 to approximately 12% by the 2010-14 timeframe.

Figure 39: Cost to develop and time to market profile

	Synthetics	Peptides	Microbials
PRODUCT DEVELOPMENT			
Cost to develop	>\$300M	\$10-20M	\$10-20M
Time to market	10 years	5-7 years	5-7 years
Safety profile	Problematic	Excellent	Excellent
COMMERCIAL EFFECTIVENESS			
Insect control	95%	95%	60-80%
Stability in the field	Often 7-10 days	7-10 days	Often 3-4 days
MANUFACTURING EFFICIENCY			
Production cost	Very low cost at large scale	Scalable, low cost	Variable
Production system	Standard chemical plant	Universal fermentation	Different for every product
Production stability	Excellent	Very good	Variable

Source: Canaccord Genuity Research, Vestaron

Corteva's Ag Biotech portfolio

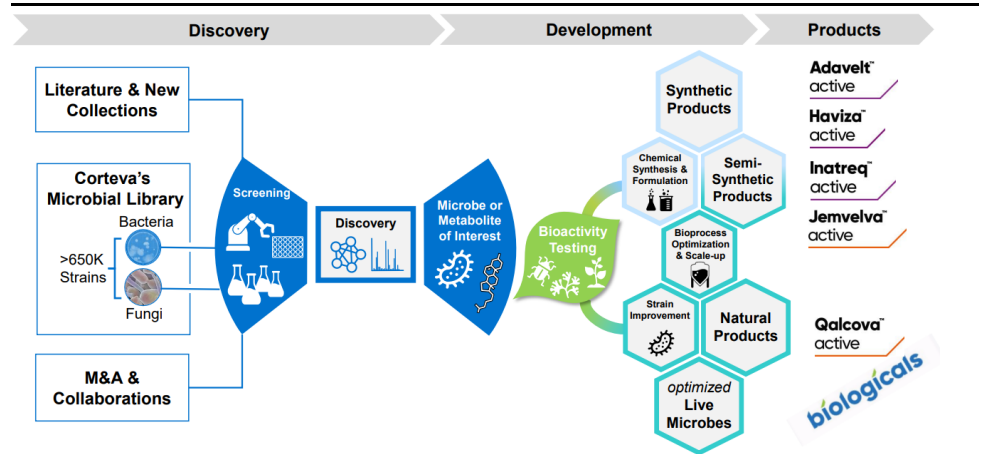
Corteva estimates 2021 addressable market size to be **~\$9B** and sees it growing to **~\$30B** by 2035.

The company's **Crop Protection** segment offers products to safeguard crop yields from weeds, insects, and diseases, helping farmers to achieve the best possible outcomes. According to Corteva, the biologicals market is expected to grow high-single digits annually through 2035, and represent approximately 20-25% of the overall crop protection market by 2035. In the past three years, Corteva has established a leading position in the biologicals industry by strategically focusing on external and internal innovations, research and development collaborations, licensing and distribution agreements and acquisitions. Corteva estimates 2021 addressable market size to be ~\$9B and sees it growing to ~\$30B by 2035.

Seed traits

Corteva is addressing the global demand for food by integrating both traditional and innovative seed and trait technologies. The company's **Seed** segment specializes in the production and delivery of commercial seed. By integrating advanced germplasm and desirable traits, it enables farmers across the globe to achieve optimal yields.

Figure 40: Corteva biological strains create diversified crop protection products



Source: Company reports

Seed traits technologies:

- Enlist Weed Control System
- Herculex Insect Protection
- Qrome corn products
- Optimum AcreMax Family
- Optimum Leptra Hybrids
- PowerCore Enlist corn
- SmartStax Trait Technology
- WideStrike Insect Protection
- WideStrike 3 Insect Protection



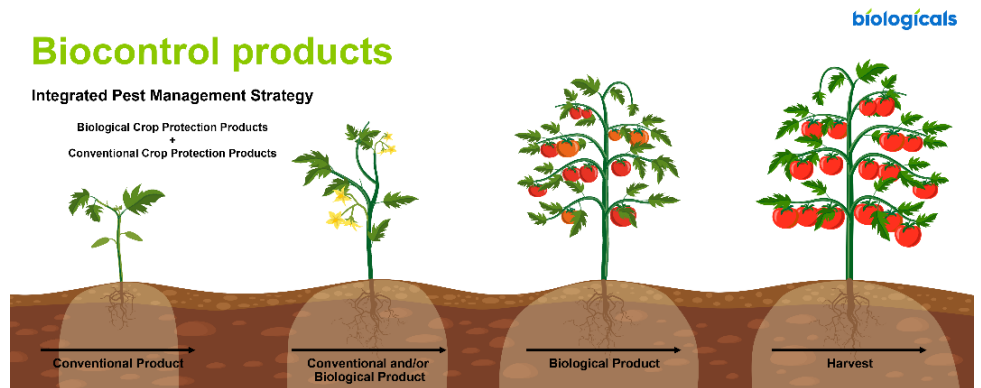
Biologicals product overview:

Biocontrol products

Corteva's biocontrol products serve as a valuable addition to traditional pest control methods and other Integrated Pest Management (IPM) approaches. By combining these biocontrol products with other techniques and interventions, farmers can significantly improve the overall efficiency of their pest control strategies.

- Bexfond biological fungicide
- Harken biological insecticide

Figure 41: Biocontrol products overview



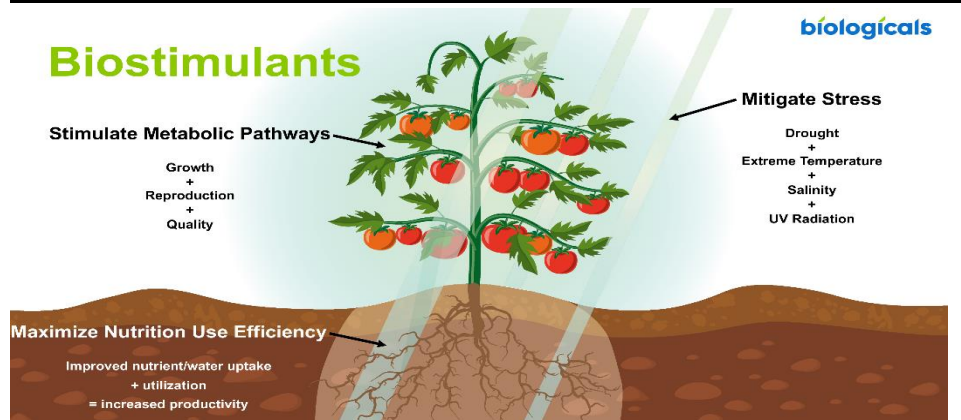
Source: Company reports

Biostimulants

Corteva's biostimulant products are developed with a dual focus on crop marketability and farmer usability. These products assist farmers in minimizing resource usage, mitigating their environmental footprint, and cultivating healthier and superior-quality crops.

- Utrisha N nitrogen efficiency optimizer
- Sosdia Stress Abiotic Stress Mitigator
- Sosdia Stress Plus Abiotic Stress Mitigator
- Utrisha P

Figure 42: Biostimulants overview



Source: Company reports

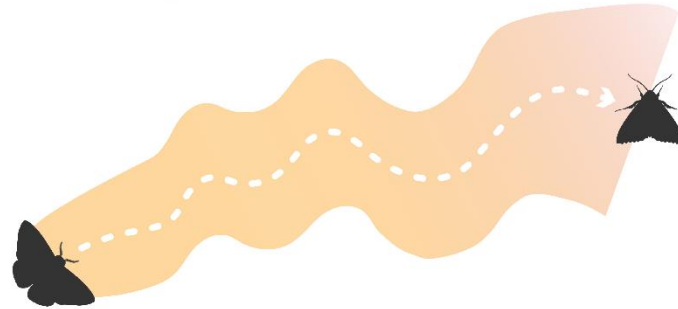
Pheromones:

Corteva plans to offer a variety of pheromone products under the brand Enrapta pheromones.

Figure 43: Pheromones overview

What are pheromones?

biologicals



Release of pheromone into insect's environment

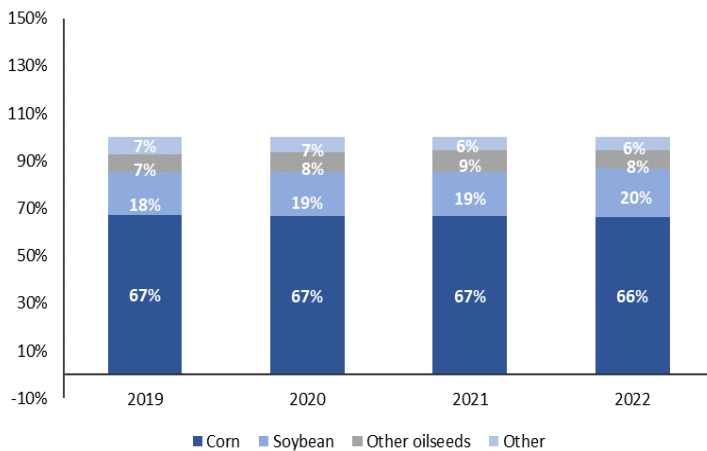
Reception of released pheromone by other insect

Source: Company reports

Seed division overview

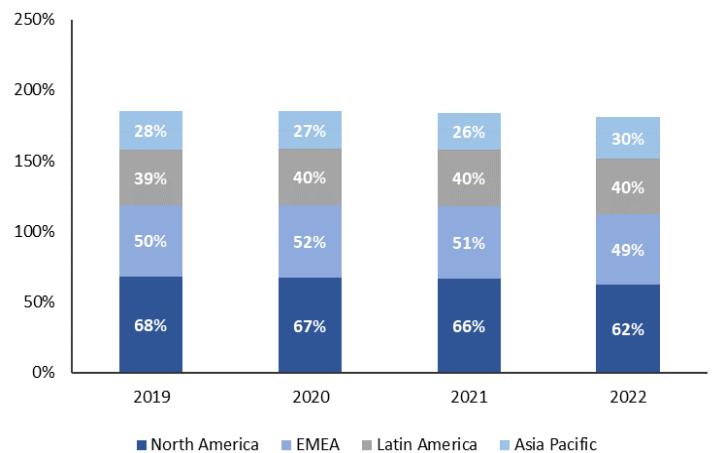
CTVA's Seed division is a key player in multiple essential seed markets, such as North America's corn and soybeans, Europe's corn and sunflower, and Brazil, India, South Africa, and Argentina's corn. The company's trait technologies help improve resistance to weather, disease, insects, and herbicides, as well as the quality of food and nutritional characteristics. Additionally, CTVA offers digital solutions that help farmers make informed decisions when it comes to maximizing yields and profitability. Within the Seed segment, the company mainly focuses on corn, soybean, other oilseeds, and other, with corn being the largest contributor to the overall segment. From 2019-2022, corn accounted for 67%-66% of total seed revenue, while soybean accounted for 18%-20%, respectively. When looking at regions, the seed segment dominates North America and has close to an even split in Europe, Middle East, and Africa (EMEA), accounting for 62% and 49% in 2022, respectively. CTVA anticipates its total addressable market for seed to grow from ~\$30 billion in 2021 to ~\$40 billion by 2035.

Figure 44: Seed revenue % by product line



Source: Company reports, Canaccord Genuity estimates

Figure 45: Seed share of total regional revenue



Source: Company reports, Canaccord Genuity estimates

Projected **high-teens operating EBITDA growth** through 2025.

Operationally, the company has undergone a global brand restructuring by retiring 11 seed brands in the US and strengthening its leadership position in germplasm. Additionally, CTVA has successfully launched new products over the past few years such as Qrome corn in North America, Enlist E3 soybeans in North America, and PowerCore ULTRA in Latin America, resulting in significant gains in market share.

To enhance profit margins, the company has established an internal capability and fostered a culture that enables it to capture value from market innovations. CTVA has streamlined its seed operations by consolidating 27 seed production locations worldwide, resulting in productivity gains of approximately \$200 million. These achievements lay a solid foundation for the company's projected high-teens operating EBITDA growth through 2025.

Figure 46: Pest management

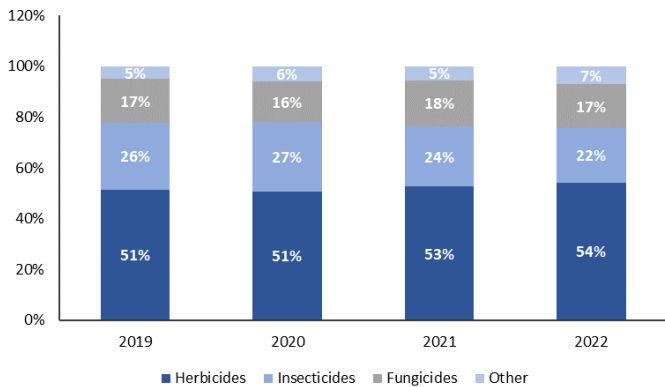


Source: Company reports

Crop protection division overview

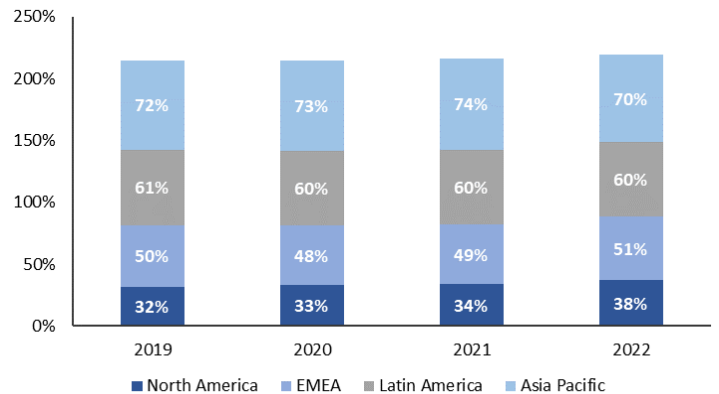
Within the crop protection segment, CTVA provides a range of agricultural input products designed to safeguard crops from weeds, insects, disease, and other pests. The company is a key player in the production of herbicides, insecticides, nitrogen stabilizers, and herbicides for pasture and range management. Within the crop protection segment, the company mainly focuses on herbicides, insecticides, fungicides, and other, with herbicides being the largest contributor to the overall segment. From 2019-2022, herbicides accounted for 51%-54% of total crop protection revenue, while insecticides (second largest subsegment) accounted for 26%-22%, respectively. When looking at regions, the crop protection segment dominates Asia Pasic and Latin America, accounting for 70% and 60% of CTVA's regional revenue in 2022, respectively. CTVA anticipates its total addressable market for crop protection to grow from ~\$65 billion in 2021 to >\$100 billion by 2035.

Figure 47: Crop Protection revenue % by product line



Source: Company reports, Canaccord Genuity estimates

Figure 48: Crop Protection share of total regional revenue



Source: Company reports, Canaccord Genuity estimates

By 2035, Biologicals are projected to make up **20-25%** of the total crop protection market.

The company aims to transform its crop protection product portfolio to a more differentiated mix, which should help drive significant margin opportunity going forward. By 2025, CTVA anticipates about two-thirds of its portfolio will be differentiated due to advancements in artificial intelligence and growing demand for new technologies.

Biologicals will be a significant focus for the company, as it anticipates strong growth in this market. CTVA sees the market increasing by 8-10% CAGR to ~\$30 billion by 2035 from ~\$9 billion in 2021. By 2035, Biologicals are projected to make up 20-25% of the total crop protection market, and the company aims to have a balanced portfolio that reflects this trend. Strengthening capabilities in biologicals discovery and development will be a priority.

Figure 49: Seed protection



Source: Company reports

External manufacturing partnerships enhance cost competitiveness

To enhance cost competitiveness, the company plans to optimize its operations by increasing reliance on external manufacturing partnerships. This shift toward a capital-light, lower-cost model will involve a better balance between internal and external manufacturing, with a target of 10% internal manufacturing, down from 25% in 2022. A robust IP strategy should facilitate the engagement of more partners, while regional alignment with customers should enhance reliability, responsiveness, and flexibility in the supply chain.

Competitive landscape:

The company faces global competition from seed germplasm producers, trait developers, and manufacturers of crop protection products. Key competitors include BASF, Bayer, FMC, Syngenta, ChemChina, as well as companies involved in trading generic crop protection chemicals and regional seed companies.

Recent acquisitions:

- **Stoller Group acquisition:** With operations and sales in more than 60 countries and 2022 estimated revenues of more than \$400 million, Stoller is expected to bring immediate scale and profitability to Corteva, particularly as its EBITDA margins are accretive to total Corteva margins. The Stoller purchase price of \$1.2 billion in cash represents an EV multiple of ~12x based on Stoller's 2022E EBITDA (Corteva estimate at the time of transaction).
- **Symborg acquisition:** This transaction continues Corteva's commitment to build a more differentiated and sustainably advantaged portfolio that provides cost-effective solutions for farmers. Corteva intends to leverage the combined organizations to scale up Symborg's current solutions, as well as launch future products under development.

Figure 50: Biologicals acquisition/consolidation table

<p style="text-align: center;"></p> <p>Acquisitions: 2022: Stoller Group acquisition. With operations and sales in more than 60 countries and 2022 estimated revenues of more than \$400 million, Stoller is expected to bring immediate scale and profitability to Corteva, particularly as its EBITDA margins are accretive to total Corteva margins. The Stoller purchase price of \$1.2 billion in cash represents an EV multiple of ~12x based on Stoller's 2022E EBITDA (Corteva estimate at the time of transaction). 2022: Symborg acquisition. This transaction continues Corteva's commitment to build a more differentiated and sustainably advantaged portfolio that provides cost-effective solutions for farmers. Corteva intends to leverage the combined organizations to scale up Symborg's current solutions, as well as launch future products under development.</p>	<p style="text-align: center;"></p> <p>Strategic collaborations: 2022: Ginkgo Bioworks. Bayer entered into a multi-year collaboration with Ginkgo Bioworks to accelerate research and development of biological products for agriculture. 2023: Partnership with Kimitec. In February 2023, Bayer and Kimitec entered into a new strategic partnership which will focus on accelerating the development and commercialization of biological crop protection solutions and biostimulants. 2023: Collaboration with Oerth Bio. In January 2023, Bayer announced a new collaboration with Oerth Bio to develop more sustainable crop protection products.</p>
<p style="text-align: center;"></p> <p>Acquisitions: 2022: Acquisition of OptiCHOS. UPL has acquired a naturally derived fungicide company, OptiCHOS for its Natural Plant Protection (NPP) business unit.</p> <p>Strategic collaborations: 2022: UPL announced a collaboration agreement with Oro Agri to co-distribute and further develop Orange Oil product, a biosolution effective against a wide range of pests and diseases. 2022: UPL announced a strategic collaboration with Agrauxine, a subsidiary of Lesaffre specializing in biological crop solutions. 2021: UPL entered into a long term strategic collaboration with Chr. Hansen, a bioscience company, to develop microbial-based biosolutions (including biostimulants and biopesticides). 2022: UPL entered into a partnership with AgBITech to bring a range of sustainable biosolutions to crops in California, Arizona and Hawaii.</p>	<p style="text-align: center;"></p> <p>Acquisitions: 2022: BioPhero acquisition. In July 2022, FMC completed acquisition of BioPhero ApS, a Denmark-based pheromone research and production company for ~\$200M. The acquisition adds biologically produced pheromone insect control technology to FMC's product portfolio and R&D pipeline. According to FMC, pheromones and pheromone-based products will contribute ~\$1bn in revenue at above-company-average EBITDA margin by 2030.</p> <p>Strategic collaborations: 2022: Micropep Technologies. Announced in December 2022, this collaboration is aimed at helping accelerate the development of new micropeptide-based bioherbicides targeting resistant weeds in corn and soybeans.</p>

Source: Company reports

Precision Agriculture primer

Precision Ag is the most relevant silo of AgTech to review for a better understanding of John Deere's innovation pipeline and long-term growth opportunity. Through its centrality within farming operations and vast array of data-collecting sensors, Deere equipment increasingly provides the foundation for many of the precision Ag efforts presently underway.

Advances in precision agriculture are central to achieving environmentally sustainable food production. By harnessing farm-level data, emerging precision Ag tools are improving the farmer's ability to apply only the necessary amounts of inputs, optimally placed in the field, and at the right time. Increasingly, precision agriculture as a management practice references environmental impact as one of its measures of success and is beginning to rely more on the soil micro-biome as an important source of actionable data. We believe the advent of user-friendly farm management platforms, able to recommend specific actions and generate a clear ROI (with or without dedicated agronomist), will be critical to the broader adoption of precision agriculture technology. The following section discusses some of the key precision Ag innovations enhancing the farmer's ability to profitably practice sustainable agriculture.

Globally the farm equipment market is many times the size of precision Ag, projected at **US\$140B** over the next five years according to Fior Markets.

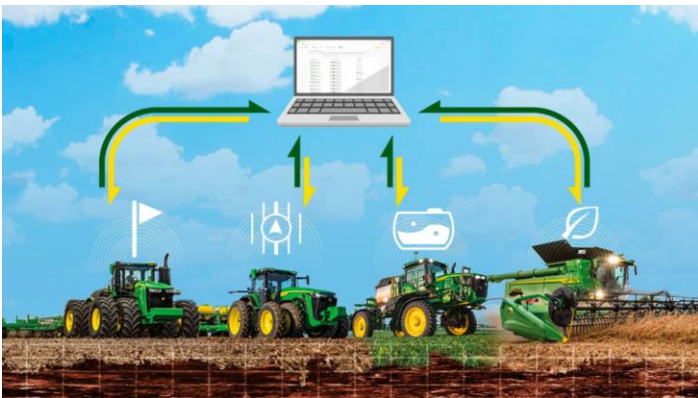
Precision agriculture should grow at double-digit clip

CG estimates the total market for precision agriculture was approximately US\$9.5B in 2020, and we expect growth of about 12% annually through 2025 to reach US\$17B. Within our estimates, we note that the specific markets for data analytics, drones, sensors, and autonomous and semi-autonomous farm equipment represent distinct multibillion-dollar opportunities. Of these segments, we expect drones to experience the most significant annual growth over the forecast period followed by sensors and agricultural analytics tools. Globally the farm equipment market is many times the size of precision Ag, projected at US\$140B over the next five years according to Fior Markets.

Precision agriculture focuses technology on operational practices

Precision agriculture is a management tool that adapts farming practices to variable conditions in the field with the goal of improving yields and reducing input costs. Continual acquisition of data is a foundational aspect of an ideal precision Ag workflow, as farmers attempt to incorporate disparate information (moisture levels, condition of the soil, plant stress from pests/disease, etc.) into their decisions. Once data is acquired, it is processed in order to produce yield and quality predictions that can inform recommendations about inputs (the what, where, and when of planting, spraying, and irrigation). Finally, recommendations can be implemented with variable rate application (VRA) technologies (seed placement, irrigation, spraying), tunable to a range of changing conditions. As precision agriculture stands today, mechanical solutions like autonomous tractors and automated irrigation and spraying systems appear to be well ahead of agronomic solutions that can effectively provide optimal input prescriptions. Software platforms that can harness disparate data and return actionable insights are beginning to close this gap.

Figure 51: Deere precision Ag technology



Source: Company reports

Figure 52: Deere tractor precision Ag technology



Source: Company reports

Substantial sustainability benefits can be derived through precision Ag

Adoption of precision agriculture technology has many sustainability benefits. At a high level, a farm that is adjusting the application of inputs to varying conditions on the field is effectively doing more with less. Using less fertilizer, pesticide, water and other resources for the same or better yields inflicts less damage on soil and the surrounding environment without compromising the long-term ability to produce enough food for growing populations. Of course, there are economic benefits as well. Cost savings and revenue potential (many of which have been quantified) and, we expect, benefits to the environment will increasingly become part of this calculus going forward.

An explosion of sensors for gathering increasingly granular data

Sensors are gathering heaps of data on the farm. In-ground sensors measure soil health and composition (pH, phosphorus, and potassium levels, organic matter, and soil type). Increasingly, understanding the composition of the soil micro-biome is considered an important means of optimizing crop production, as well. On the imagery front, several layers of data about the field can be obtained. Remote sensing technologies like aerial drones (outfitted with cameras, sensors, and GPS receivers) are capturing images to help gauge stress on plants from pests and disease. When combined with data from satellites and other sensors, a wide range of tasks can be performed including yield prediction, disease and pests identification, optimizing water schedules, and adjusting to anticipated changes in weather.

Some of the sensors commercially available to farmers include:

- Airflow sensors: determine the soil permeability for air.
- Dielectric soil moisture sensors: utilize an electric current to determine the moisture level of soil.
- Electrochemical sensors: use electrodes to identify soil chemical data including pH and soil nutrient levels.
- Location sensors: utilize GPS signals from satellites to precisely determine geographic locations and altitude of specific markers in a field. Sensors and the positioning provided allow farmers to more precisely categorize field areas.
- Mechanical sensors: Measure soil compaction and mechanical resistance of soil.
- Optical sensors: utilize light reflectance across multiple spectrums to measure soil properties. Sensors can be placed in soil, on aerial platforms or machinery to capture classification data on plants and soil.
- Weather stations: Sensor systems which combine multiple functions to measure data on crops and the climate.

According to a report by the IEEE, self-guided systems farm approximately **60%** to 70% of the crop acreage in North America, more than **90%** of acreage in Australia and between **30% and 50%** in Europe.

Autonomous ground vehicles

Along with drones, autonomous ground vehicles (AGVs) can be used for farming applications to complete traditional tasks, including tracking plant growth, monitoring plant health, and mapping arable land for topographical details. Vehicles can be equipped with farm tools, sensors, GPS-based navigation and artificial intelligence to enable varying levels of autonomy. Unlike a human workforce, AGVs can be used almost around the clock. According to a report by the IEEE, self-guided systems farm approximately 60% to 70% of the crop acreage in North America, more than 90% of acreage in Australia and between 30% and 50% in Europe. Along with fully automated tractors, autonomous and semi-autonomous vehicles are currently being used in fields to identify and monitor the presence of plant disease, assess soil nutrition, identify the presence of weeds and insects, and measure plant growth. Many precision agriculture advances – including various degrees of automation and a host of sensors – have been incorporated into most of the leading heavy equipment manufactured for farm use, including by leading OEMs John Deere, Kubota, Massey Ferguson and New Holland Agriculture.

Figure 53: John Deere autonomous tractor



Source: Company reports

Processing data leveraging the cloud

Drones and other precision agriculture tools capture high volumes of data. Service providers and farmers typically utilize sophisticated software and cloud-based data processing to process captured data and generate insights including changes in crop health, changes in soil temperature and anomalies in production. Recommendations can be input into farm management systems and factored into farming decisions as well as shared across operations.

Precision irrigation: communication across sensors preserves precious resource

Efficient water use is an important objective within precision agriculture practices, and sensor technology is broadly deployed within irrigation systems of sophisticated operators. Flow sensors are used to measure water use while soil moisture sensors buried in the root zone of trees, turf and shrubs measure the moisture content and initiate changes to irrigation plans. Suspended cycle irrigation sensors stop programmed watering schedules when moisture content is deemed to be sufficient, and on-demand irrigation sensors initiate watering as needed. Weather-based controllers collect environmental data including temperature, windspeed, solar radiation and humidity to inform and/or initiate action related to the irrigation needs.

With each sensor type, the driver of adoption is to make irrigation processes more effective and efficient. Sensors can ensure that plants are properly watered in order to maintain growth consistency while limiting overwatering. Overwatering can be harmful for crops as well as soil viability, leading to anaerobic soil conditions and nutrient leaching over time. According to the Irrigation Association and International Center for Water Control at California State University Fresno, smart irrigation systems with embedded sensors can reduce water use by up to 20% when compared to traditional irrigation controllers. A subsequent study by the Nebraska Ag Water Management Network estimated that irrigation sensors drive water savings of approximately two inches per acre annually. The cost of applying two inches of water per acre can easily range between \$10 to \$30.

Precision seeding: Leveraging data to execute variable rate seeding

Field variability creates challenges and opportunities for seed placement. With the right data, yield maps, and prescriptive models, farmers are using variable rate seeding to help maximize yield. The goal is to optimize seed density across the field by accounting for high-yielding and low-yielding areas. The seeds being planted are taken into account, with seeding scripts adjusted to specific seed brand. Writing a customized seeding script can be difficult and time consuming, and increasingly farmers and agronomists are using third-party tools to quickly create effective seeding scripts.

Advancing integrated pest management (IPM)

IPM takes a holistic approach to controlling pests on the farm. Rather than acting whenever the presence of pests is detected, IPM sets thresholds below which pests may be tolerated, distinguishes between harmful and beneficial insects, and values intimate knowledge of a pest’s lifecycle and habits. Implementing precision crop protection within an IPM practice requires early detection of pests and ongoing monitoring of their activity. With advances in drones, sensor technology and AI, farmers are able to deploy emerging pest management solutions that offer greatly improved accuracy and efficiency in pesticide application.

Soil health and leveraging the soil micro-biome

Collecting data from soil samples is standard practice for many farming operations. Historically, the process can be imprecise and time-consuming, with testing times taking days and weeks and soil characteristics varying across large farms. Sensor technology has advanced in recent years and sensors can now be utilized to track granular details about soil such as fertilizer efficacy, moisture levels, soil permeability, salt concentration, and other characteristics.

Going forward, we expect data on the soil micro-biome to augment this analysis and help inform precision Ag strategies. Similar to our own micro-biome, interactions between the plant, its environment, and a community of microorganisms in the soil can provide various benefits including drought and heat tolerance, enhanced nutrient uptake, and resistance to pests and diseases. Targeted delivery of microbes either on-seed or in-furrow with pop-up fertilizer allows for precise application of the microbes with the seed using standard equipment.

While advanced technologies for variable-rate seeding, nutrient application, and yield monitoring are allowing more precise management of crop production, additional data about soil health and microbiological makeup can further enable informed prescriptions. We believe advanced soil insights can be applied to seed and nutrient selection, biologics, and other phytobiome components as part of the next generation of precision Ag solutions.

Figure 54: DE precision Ag tech



Source: Company reports

John Deere’s Precision Ag-centric portfolio

Figure 55: DE Precision Ag



Source: Company Reports

John Deere envisions becoming a leading AI and robotics company in the next decade. While the perception of Deere as a traditional manufacturer of heavy machinery may contradict this vision, the company's commitment to automation and autonomy is evident. Deere showcased its fully autonomous 8R farm tractor, driven by AI, at the Consumer Electronics Show in 2022. This achievement is the result of nearly two decades of strategic planning, investment in automation, data analytics, GPS guidance, IoT connectivity, and software engineering.

Deere has also pursued acquisitions and partnerships with Ag tech startups to enhance its technological capabilities. The company recognizes that technology will drive value creation, increase productivity, profitability, and sustainability for farmers. While Deere has made significant progress, it is still in the early stages of the autonomy process. However, its established automated systems, such as GPS-based self-steering and precision seeding, contribute to its value and profitability. Deere's autonomous 8R tractor represents a significant advancement in Ag tech and has garnered attention and credibility within the industry. The integration of computer vision, machine learning, and autonomous driving technology from acquisitions like Blue River Technology and Bear Flag Robotics further solidify Deere's position in the field. Deere's focus on AI and robotics extends beyond its own equipment, as seen through collaborations with startups and the establishment of a Startup Collaborator program. While Deere faces competition from other agricultural machinery manufacturers, it remains committed to bringing autonomy to its farm equipment and exploring retrofit opportunities for existing fleets.

The **Production and Precision Agriculture** segment develops and delivers equipment and technology solutions for large-scale grain, cotton, and sugarcane growers. The main products in this segment include tractors, combines, harvesters, and various equipment for soil preparation, seeding, and crop care. During fiscal year 2022, the segment accounted for 46% of the total product revenue and generated a 20% operating margin.

Figure 56: Precision Ag



Source: Company reports

Figure 57: Utility tractor



Source: Company reports

The **Small Agriculture and Turf** segment focuses on providing equipment and technology solutions for dairy and livestock producers, high-value crop producers, and turf and utility customers. The products in this segment range from small to mid-size tractors, hay and forage equipment, lawn equipment, golf course equipment, and utility vehicles. During fiscal year 2022, the segment accounted for 28% of the total product revenue and generated a 15% operating margin.

The **Construction and Forestry** segment offers a wide range of machines and technology solutions for earthmoving, forestry, and roadbuilding projects. This includes crawler dozers, loaders, excavators, skid-steer loaders, milling machines,

and log harvesters. During fiscal year 2022, the segment accounted for 26% of the total product revenue and generated a 16% operating margin.

Figure 58: Compact track loaders



Source: Company reports

The **Financial Services** segment provides financing options for the sales and leases of equipment from John Deere dealers. The segment also offers wholesale financing to dealers, retail revolving charge accounts, and extended equipment warranties.

John Deere is leaning into precision Ag through four tools: displays, Starfire receiver, JDLink connection, and John Deere Operations Center.



Source: Company reports

In-cab displays: The presence of touchscreen displays inside the farmer's tractor cabin enables convenient management of various tasks such as guidance lines, application rates, input placement, and more.

StarFire receiver: This technology offers enhanced performance and reliability for farmers. With a multi-constellation satellite signal, it reduces the time required to achieve precise signal accuracy. Moreover, its season-to-season repeatability ensures minimal drift in guidance lines, coverage, and boundaries.

JDLink connection: JDLink is the connection that facilitates seamless data transfer between connected machines and the owner's John Deere Operations Center account. JDLink connectivity allows for the sharing of machine and agronomic data, eliminating the need for additional subscriptions or renewals. John Deere is providing this service at no extra cost to its existing customers.

John Deere Operations Center: John Deere Operations Center is a web-based farm management system that offers convenient access to farm information from various devices such as web browsers, tablets, and smartphones.

Competition

Companies like AGCO Corporation, CLAAS KGaA mbH, CNH Industrial N.V., Kubota Tractor Corporation, Mahindra, and The Toro Company are among the global competitors in the agriculture and turf operations sector. Additionally, there is competition from short-line and specialty manufacturers, as well as local regional competitors, each employing different manufacturing and marketing methods.





In the construction and forestry segment, global competitors include Caterpillar Inc., CNH Industrial N.V., Doosan Infracore Co., Ltd., Doosan Bobcat Inc., Fayat Group, Hitachi Construction Machinery, Komatsu Ltd., Kubota Tractor Corporation, Ponsse Plc, SANY Group Co., Ltd., Terex, Tigercat Industries Inc., Volvo Construction Equipment, and XCMG.

Recent acquisitions:

- **Light:** In 2022, Deere acquired Light a depth perception and visioning technology that utilizes artificial intelligence. Deere has integrated Light's platform, Clarity, into its autonomous tractors.

- **AgriSync:** In 2021, Deere acquired a dealer customer service platform. The terms of the deal were not disclosed.
- **Bear Flag Robotics:** Deere acquired Bear Flag Robotics, an autonomous driving technology company, for \$250 million in 2021. Bear Flag's technology complements Deere's own technological initiatives and goals, aiming to assist farmers in achieving optimal results and addressing significant agricultural challenges through the integration of advanced technologies, including autonomy.
- **Kreisel Electric:** In 2022, Deere completed the acquisition of a majority stake in Kreisel Electric, Inc., a battery technology provider based in Austria. The company specializes in manufacturing high-density and durable electric battery modules and packs specifically designed for high-performance and off-highway applications. Additionally, it developed CHIMERO, a robust infrastructure platform for high-powered charging that incorporates battery buffering technology.
- **Harvest Profit:** Deere acquired Harvest Profit, a provider of farm profitability software headquartered in Fargo, North Dakota, in 2020. Harvest Profit's software enables farmers to forecast and assess profitability on a per-field basis, providing valuable economic insights to facilitate informed and proactive management decisions.

Figure 59: Precision Ag acquisition/consolidation table

 <p>Acquisitions: 2022: Appareo Systems, specializes in the research, development, design, and manufacture of tangible technology that utilizes A.I., mechatronics, and innovative electronics designed to deliver exceptional customer value. 2022: JCA Industries, autonomous agricultural machinery software developer. 2021: Faromatics, precision livestock robotics company.</p> <p>Investments: 2021: Greeneye Technology, precision spraying technology, 2.9% equity investment. 2021: Apex.AI, safety-certified software for autonomous applications, 2.53% equity investment.</p>	 <p>Acquisitions: 2021: NX9, software suite with ISOBUS core technology focus. 2021: Raven Industries, precision technology company, purchased for \$58 per share, representing a 33.6% premium to the Raven Industries 4-week volume-weighted average stock price.</p> <p>Investments: 2021: Augmenta, real-time data processing for autonomous farm applications, minority stake investment. 2021: Monarch Tractor, electric autonomous tractors, minority stake investment.</p>
 <p>Acquisitions: 2022: Light, depth perception and visioning technology using artificial intelligence. DE integrated Light's platform, Clarity, into its autonomous tractors. 2021: AgriSync, a dealer customer service platform, purchase price unknown. 2021: Bear Flag Robotics, autonomous driving technology, purchased for \$250 million. 2021: Kreisel Electric, acquired majority ownership in a leading pioneer in the development of immersion-cooled battery technology. 2020: Harvest Profit, provider of farm profitability software.</p>	 <p>Acquisitions: 2021: AgJunction, autonomous machine control applications. 2022: FarmX, irrigation automation and management platform, additional investment following initial April 2020 investment.</p> <p>Investments: 2021: Advanced Farm Technologies, automated strawberry harvesting, additional investment following initial August 2019 investment. 2021: Bloomfield Robotics, fruit and tree crop monitoring using artificial intelligence. 2021: Routrek Networks, automated irrigation and fertilization systems for indoor farming. 2021: Tevel, wired drone harvesting service.</p>

Source: Company reports, Canaccord Genuity Research

Corteva and Deere operate within the constraints of well established agriculture cycles

Despite the technological innovations and sustainability benefits clearly exhibited within the above Ag Biotech and Precision Ag overviews, investment recommendations for CTVA and DE should consider the potential volatility introduced through agricultural economic cycles. Our overall view on the current Ag cycle is modestly positive. We appear to be amidst a pause in growth for the sector, as commodity prices decline and farm income retreats somewhat from lofty 2022 levels. Despite these near-term headwinds, USDA data indicates farm balance sheets remain healthy, and geopolitics appear generally supportive of more production. Even falling food commodity prices are being offset somewhat by sharper declines for fertilizers. In this environment, we don't expect a prolonged or steep pullback for farm income or demand for inputs and equipment. Nevertheless, it is important to review the mechanics of Ag cycles and touch on past cycles for context. We also look more closely at present conditions for commodity prices, exports, planted acres, and expected yields. With rates having risen sharply, we also review their expected impact on agriculture including any impact on farmland values and equipment spend.

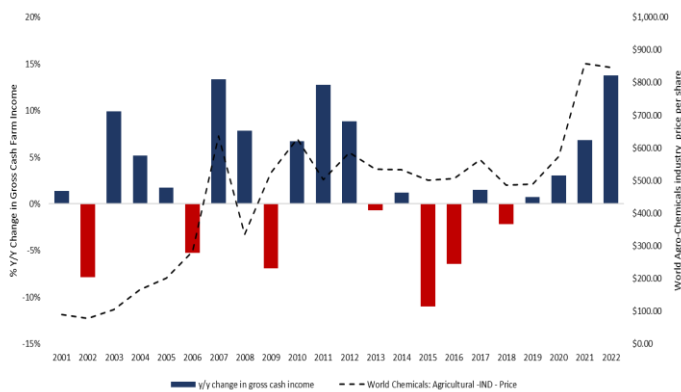
Defining the Ag cycle as peaks and troughs for farm income

Regardless the pace of innovation, agriculture experiences significant peaks and troughs when viewed through the lenses of farm income and commodity prices. Sources of such booms and busts are diverse and can range from conflict-derived supply disruptions to a sudden surge in demand from a rising middle class. Changes in trade policies between nations have also been known to propel Ag cycles, as have rapid shifts in agricultural technology.

Farm incomes influence prospects of both companies

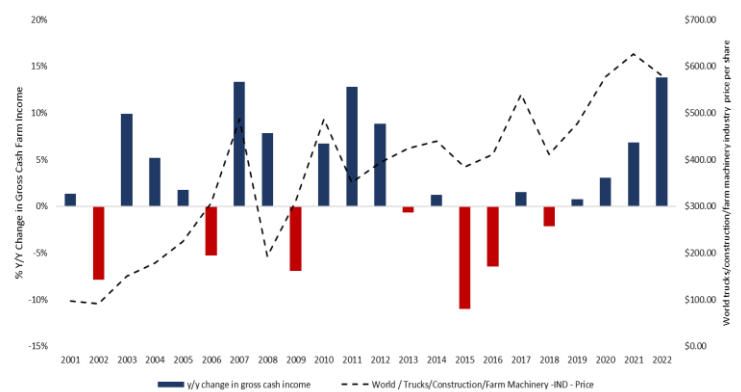
Looking at the performance of Ag inputs and equipment, we see strong correlations with the rise and fall of gross farm cash receipts, which in turn are mainly driven by the interrelated variables of commodity price performance (can be an expression of the subsequent three), export demand, planted acres, and yields. It follows that the TAMs Corteva and Deere sell into and the near- and medium-term prospects of both companies are also affected by ag's cyclical dynamics.

Figure 60: World agro-chemicals vs gross farm income



Source: FactSet, Canaccord Genuity estimates

Figure 61: World trucks/construction/farm machinery vs gross farm income



Source: FactSet, Canaccord Genuity estimates

Historical Ag cycles

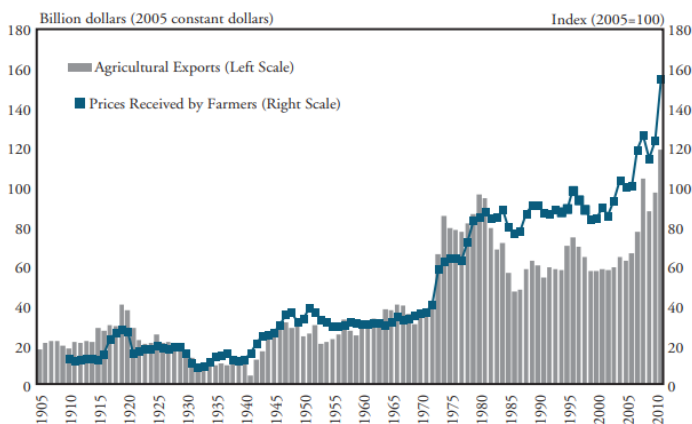
Since changes in farm income meaningfully impact demand for agricultural inputs and equipment, we take a closer look at past farm income cycles in the US, reviewing the positive and negative drivers of their historical peaks and troughs. Over the past 100+ years, US agriculture has experienced a series of booms and busts attributable to shifts in supply and demand, and influenced by prevailing interest rates. Cyclical upturns, characterized by soaring commodity prices, expanding profits, and rising farmland values, have tended to coincide with export growth and loose monetary policy. Conversely, farm incomes have historically come under pressure with a drop in exports and a tightening of credit. In both cyclical phases, technological shifts and changes in trade policy have also played important roles.

Conflict, global food production and US exports

World War I was the 20th century's first agriculture boom, disrupting food production in Europe and elsewhere, and fueling massive demand for US exports. War broke out in 1914, and by 1919, US agricultural exports had risen nearly 100% from their prewar levels (~4x for livestock). With the rising exports on wartime food demand and disrupted production came a concurrent record spike in commodity prices, with prices received by farmers doubling from 1915-1918. As a result, and despite surging input costs, gross farm income rose 70% during the period and net farm profits grew 60%, remaining at high levels through the close of the decade. While the demand side of the equation didn't change enough post war to precipitate a crash in US farm incomes, the supply side did. Global food production rebounded in the early 1920s, leading to a collapse in exports and prices (the former returned to prewar levels by 1922 and prices crashed 40% from 1919-1921).

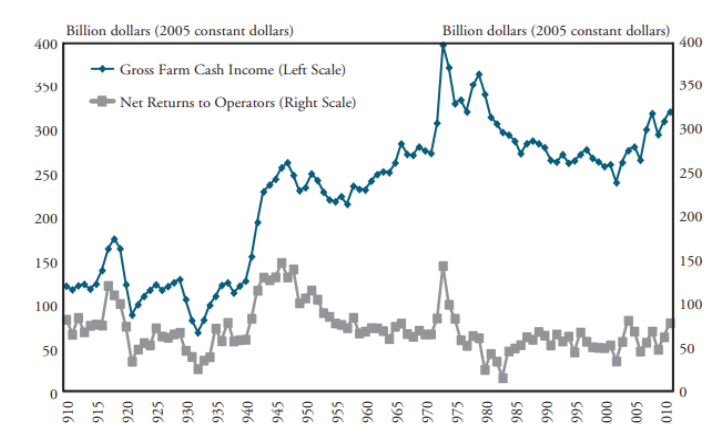
In a near-repeat of the above, **World War II** drove the second major agricultural cycle of the previous century. During the war, global food demand rose dramatically, while supply once again saw disruptions, with almost every major country at war except the US at the war's beginning. Between 1941 and 1944, US agricultural exports rose roughly six-fold from \$4.3B to \$25B. Prices again surged (back to WWI highs), as did farm incomes and profits. Once the US entered the war, however, available labor was dramatically reduced, marking a segue into our review of technological impacts on past farm income cycles.

Figure 62: U.S. Ag exports and index prices received by U.S. farmers



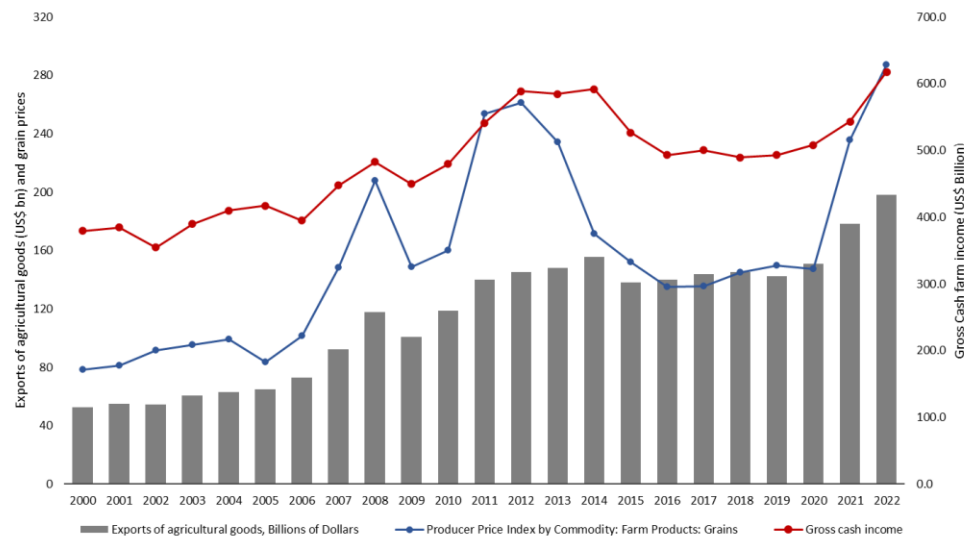
Source: Federal Reserve Bank of Kansas City, Calculations based on U.S. Census Bureau and USDA data deflated with CPI from the Federal Reserve Bank of Minneapolis

Figure 63: Gross farm income and net return to farm operators



Source: Federal Reserve Bank of Kansas City, Calculations based on U.S. Census Bureau and USDA data deflated with CPI from the Federal Reserve Bank of Minneapolis.

Figure 64: U.S. agricultural exports and grain prices (2000-2022)



Source: FRED, Canaccord Genuity Research

Innovation and trade

The effects of industrialization were felt by agriculture prior to World War II. From the 1910s through the 1930s, **adoption of the tractor** and other mechanized farm equipment – advertised as “Better and cheaper than horses” – reduced the need for draft animals. The associated reduction in feed demand and increased productivity brought by mechanization exacerbated effects on prices from the Great Depression’s collapse in agricultural exports.

Following the Second World War, prices retrenched somewhat, but didn’t experience a severe crash like what followed World War I. Techniques for hybridizing remotely related species drove a boom in **hybrid seeds**, leading not only to bumper crops, but helping fuel a sustained boom for US agricultural exports. This was aided somewhat by the **Agricultural Trade and Development Assistance Act** of 1954, which provided food assistance to foreign nations, elevated exports, and set a higher floor for agricultural commodity prices through the 1960s. Mechanization and hybridization had the additional effects of driving consolidation, as fewer farmers could operate greater numbers of increasingly productive acres. Between 1935 and 1969, the number of farms in the US declined from 7 million to 3 million, stabilizing profits by the beginning of the 1970s.

A third cycle occurred from the 1970s through the 1990s. Trade negotiations opened additional markets for US exports in China and Russia led by the **1972 Russian wheat deal**, which piled on to previous gains and drove exports toward \$100B by 1979. This cycle’s boom/bust dynamic was even more pronounced than the 1910s-1930s cycle, with early massive gains in farm income, exports, and prices curtailed shortly thereafter by a combination of global debt troubles, a strong dollar, and trade barriers (Russian trade embargo, etc.). Along with falling exports, the commodity price was aided by yield gains captured from the previous decade’s tech-enabled “**Green Revolution**” as innovations in crop protection and irrigation were more broadly deployed to boost supply.

Where are we in the current cycle?

We are taking a cautious view on the current cycle, as commodity prices pull back and farm income appears poised to decline. We believe headwinds could be brief and shallow, however, as conflict in Europe continues to constrain supply, and farmer balance sheets appear healthy.

Farm balance sheet health

USDA forecast for the farm sector shows an increase in equity, assets, and debt in 2023. Farm sector equity is projected to rise by 5.0% to reach \$3.51 trillion in nominal dollars. Farm sector assets are expected to increase by 5.2% to \$4.05 trillion, while farm sector debt is projected to increase by 6.2% to \$535.1 billion in 2023. When adjusted for inflation, the forecasted increases in farm sector equity, assets, and debt are 2.1%, 2.3%, and 3.3%, respectively.

Farm real estate assets, including land and its attachments, are expected to reach \$3.39 trillion in 2023, accounting for 84% of total farm sector assets. These real estate assets are forecasted to increase by 6.3% in nominal dollars, mainly driving the overall increase in total assets. Adjusted for inflation, real estate assets are expected to increase by 3.4%. Non-real estate assets encompass investments, financial assets, inventories of crops, animals, purchased inputs, and machinery/vehicles.

Total farm sector debt is projected to increase in 2023 compared to 2022, with growth expected in both real estate and non-real estate debt. Farm real estate debt is forecasted to reach \$375.9 billion in 2023, representing a 7.7% increase in nominal terms and a 4.7% increase in inflation-adjusted dollars. Non-real estate debt is expected to increase to \$159.2 billion in nominal terms, a 2.8% increase, but it is anticipated to remain stable when adjusted for inflation.

Figure 65: Farm sector balance sheet projections

	2016	2017	2018	2019	2020	2021	2022F	2023F	Change 2021–22F	Change 2022F–23F
Balance sheet of the U.S. farming sector										
<i>Billion dollars (nominal)</i>										
									<i>Percent</i>	<i>Percent</i>
Sector financial measures										
Farm assets:	2,914.4	3,005.9	3,026.7	3,075.1	3,174.6	3,497.6	3,848.2	4,047.0	10.0	5.2
Real estate	2,401.4	2,472.8	2,510.2	2,546.0	2,640.9	2,896.0	3,188.2	3,389.6	10.1	6.3
Animals and products	109.0	107.1	97.1	99.2	98.3	104.1	132.3	125.5	27.1	-5.2
Machinery and motor vehicles	255.4	272.3	271.0	279.0	278.8	308.3	322.7	337.8	4.7	4.7
Crops stored	55.7	56.8	59.7	49.6	50.6	58.1	52.5	49.0	-9.6	-6.8
Purchased inputs	14.9	15.8	16.1	13.9	14.0	18.3	19.7	20.7	7.5	5.4
Financial assets	78.1	81.1	72.6	87.5	92.0	112.7	132.7	124.4	17.8	-6.3
Total farm debt:	374.2	390.4	402.6	420.5	441.3	474.1	503.9	535.1	6.3	6.2
Real estate	226.0	236.2	245.8	267.9	288.6	324.3	349.1	375.9	7.7	7.7
Farm Credit System	103.7	107.2	113.0	125.2	140.5	158.1	NA	NA	NA	NA
Farm Service Agency	5.9	6.0	6.6	8.0	9.3	10.6	NA	NA	NA	NA
Farmer Mac	5.5	6.2	6.5	7.6	8.7	9.5	NA	NA	NA	NA
Commercial banks	84.4	88.4	92.9	97.9	96.8	100.8	NA	NA	NA	NA
Life insurance companies	13.2	15.0	15.9	17.8	19.2	21.1	NA	NA	NA	NA
Individuals and others	12.5	12.6	9.9	10.6	13.2	23.0	NA	NA	NA	NA
Storage facility loans	0.7	0.8	0.8	0.9	1.0	1.1	NA	NA	NA	NA
Nonreal estate	148.2	154.2	156.8	152.6	152.6	149.9	154.8	159.2	3.3	2.8
Farm Credit System	49.4	51.1	53.4	53.0	55.3	56.6	NA	NA	NA	NA
Farm Service Agency	3.8	4.0	3.9	3.8	3.7	3.4	NA	NA	NA	NA
Commercial banks	73.2	73.3	75.4	71.1	63.1	65.1	NA	NA	NA	NA
Individuals and others	21.8	25.8	24.2	24.7	30.5	24.8	NA	NA	NA	NA
Farm equity	2,540.3	2,615.5	2,624.1	2,654.7	2,733.4	3,023.5	3,344.3	3,511.9	10.6	5.0
Selected ratios:										
<i>Percent</i>										
Debt-to-equity	14.73	14.93	15.34	15.84	16.14	15.68	15.07	15.24	NA	NA
Debt-to-asset	12.84	12.99	13.30	13.67	13.90	13.56	13.09	13.22	NA	NA

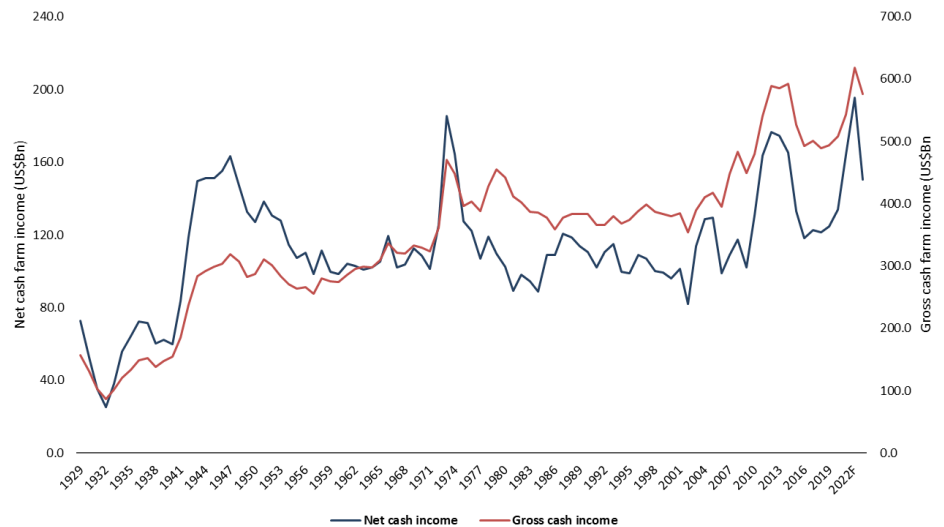
Source: USDA, Canaccord Genuity Research

Detail of current farm income projections

According to the USDA, net farm income in 2022 reached record levels in nominal terms and the highest in decades when adjusted for inflation. However, projected decreases in commodity prices are likely to lead to lower net farm income in both 2023 and 2024. While nominal net farm income is expected to remain above \$100 billion each year, real net farm income is predicted to decline and return to levels similar to those experienced between 2016 and 2020.

Farm cash receipts saw a rise in 2022 due increased sales from both livestock and crops, which more than offset the reduction in government payments. This resulted in an overall boost in combined revenue. However, in 2023, there is a projected decrease of \$39 billion in crop and livestock receipts, and government payments are expected to decline by \$5 billion in the absence of new programs. In subsequent years, receipts are expected to grow gradually, while payments are anticipated to remain relatively stable.

Figure 66: Net and gross cash farm income



Source: USDA, Canaccord Genuity Research

Farm production expenses

The United States Department of Agriculture (USDA) predicts that farm sector production expenses, including for operator dwellings, will rise by \$18.2 billion (+4.1%) from 2022 to a total of \$459.5 billion in 2023. Adjusting for inflation, these expenses are expected to increase by 1.3% from 2022, but they will still be lower than the peak levels seen in 2014. Most expense categories are projected to remain higher than their 2021 levels in both nominal and inflation-adjusted terms.

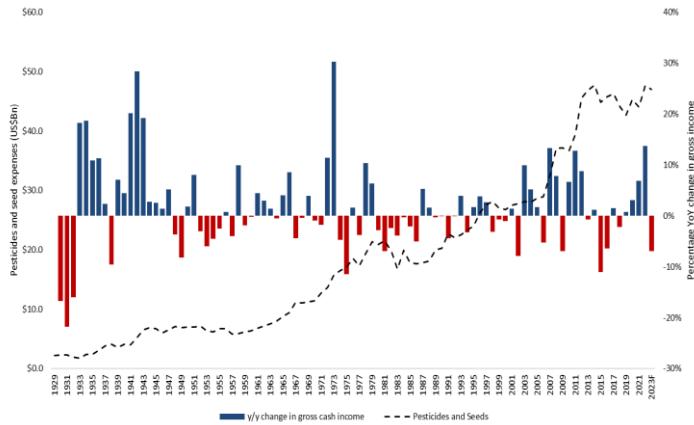
The largest expense category, feed expenses, is anticipated to be \$72.7 billion in 2023. This represents a decrease of \$3.9 billion (5.1%) compared to 2022, following a significant increase of \$11.3 billion (17.4%) in 2022. Fertilizer-lime-soil conditioner expenses, the second largest category, are expected to reach a record high of \$42.5 billion in 2022 but are projected to slightly decline to \$42.2 billion in 2023.

Interest expenses, including for operator dwellings, are forecasted to rise by \$6.2 billion (22.4%) to reach \$33.8 billion in 2023. This increase reflects the expected growth in debt levels and interest rates, albeit at a slower pace than in 2022. Livestock and poultry expenses are predicted to increase by \$4.8 billion (13.6%) to \$40.2 billion in 2023, similar to the increase observed in 2022. Labor expenses, including noncash employee compensations, are projected to rise by \$2.9 billion (7.3%) to \$42.5 billion when adjusted for inflation.

Fuel and oil expenses are expected to decrease by \$3.0 billion (14.9%) to \$17.1 billion in 2023, driven by lower diesel prices forecasted by the U.S. Energy Information Agency. Net rent is forecasted to decline by \$1.6 billion (8.2%) to \$18.2 billion in 2023, reflecting a decrease in net income.

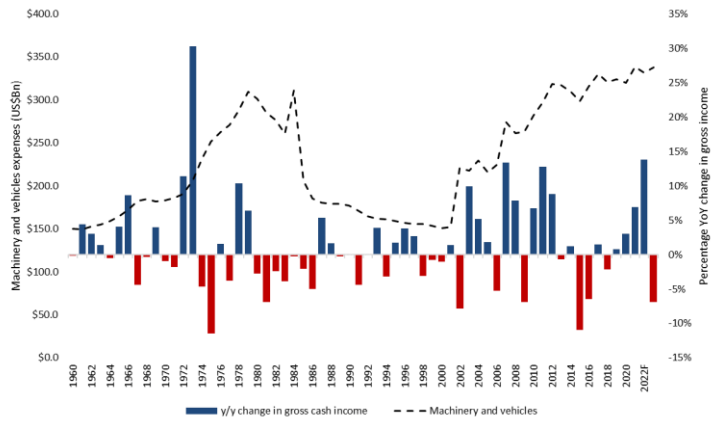
Seed expenses and pesticides are anticipated to increase in nominal dollars but decrease when accounting for inflation. Seed expenses are projected to increase by \$0.5 billion in nominal terms but decrease by \$0.1 billion in real terms, while pesticides are expected to increase by \$0.2 billion in nominal dollars but decrease by \$0.5 billion in real dollars.

Figure 67: YoY change in gross income vs pesticides and seed expenses



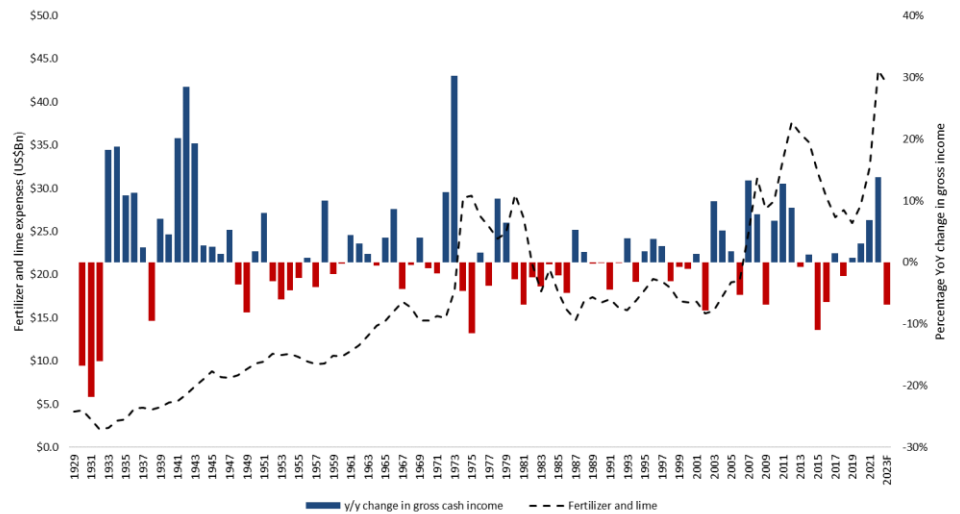
Source: USDA, Canaccord Genuity Research

Figure 68: YoY change in gross income vs machinery and vehicles expenses



Source: USDA, Canaccord Genuity Research

Figure 69: YoY change in gross income vs fertilizer and lime expenses



Source: USDA, Canaccord Genuity Research

Increase in farmland values likely to level off

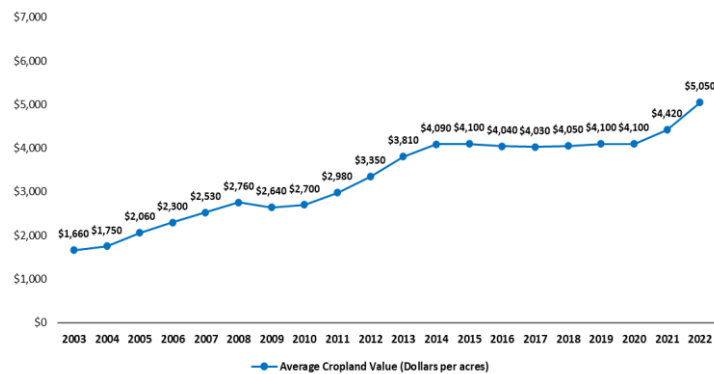
According to recent USDA reports, farmland values in various parts of the United States are continuing to increase. The rise in farm income during 2022, along with the historically robust farm income in 2023, contribute to a projected 5% increase in farm real estate value for 2023. However, the decrease in farm income, combined with the upward trend of interest rates and interest expenses, imposes restrictions on the extent to which farmland values can continue to rise in the future.

Figure 70: Land rental rates and real estate values

Calendar year	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
<i>(Dollars per acre)</i>											
Rental rates											
Cropland	148	157.97	160.24	157.9	158.63	160.66	162.55	163.93	163.93	162.9	161.46
Pasture	14	15.03	15.03	14.71	14.61	14.55	14.42	14.29	14.12	13.9	13.66
Value of farm real estate	3,800	4,011	4,028	4,042	4,097	4,148	4,187	4,216	4,217	4,194	4,161

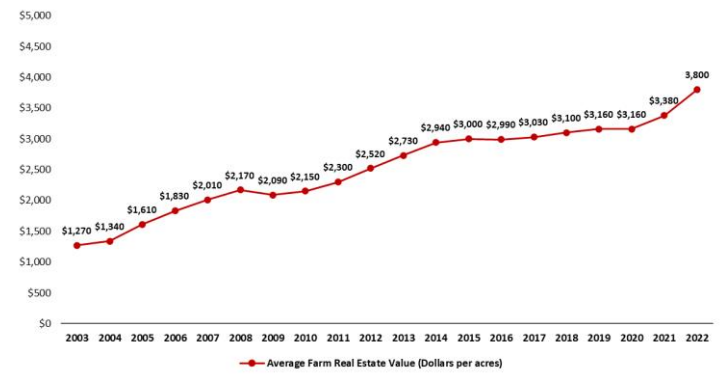
Source: USDA, Canaccord Genuity Research

Figure 71: Avg. cropland value (dollars per acre)



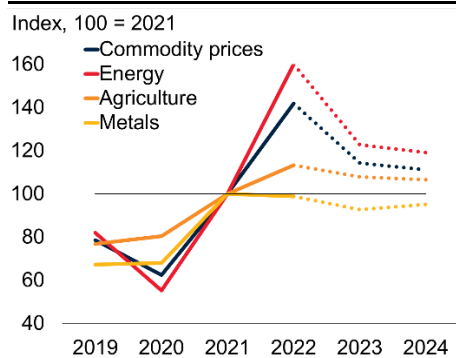
Source: USDA, Canaccord Genuity Research

Figure 72: Avg. farm real estate value (dollars per acre)



Source: USDA, Canaccord Genuity Research

Figure 73: Commodity price forecasts



Source: Bruegel Research Service; EM-DAT (database); Food and Agriculture Organization of the United Nations; World Bank.

Commodity prices outlook

According to the World Bank's Commodity Markets Outlook report, agricultural prices are projected to decrease by 7% in 2023 and continue to decline further in 2024. Food prices are expected to drop by 8% in 2023 and 3% in 2024, assuming that exports of grain and oilseed from the Black Sea region remain stable. However, despite these reductions, real food prices in 2023 will remain the second highest since 1975, surpassed only by 2022. The number of people facing food insecurity is estimated to increase to over 349 million globally this year, twice the number in 2020. This is primarily due to high prices of food and fertilizer, conflicts, and economic and climate-related shocks. The occurrence of natural disasters is strongly linked to a significant rise in the number of households experiencing food insecurity, especially in low-income countries. Agricultural raw material prices, such as cotton, timber, and rubber, are projected to decrease by approximately 6% in 2023 due to stagnant global industrial demand. However, these prices are expected to rebound by 2% in 2024 as China's demand improves.

Planted acres outlook

According to the USDA's Prospective Plantings report released on March 31, farmers in the US intend to significantly increase corn acreage in 2023. The report shows

that surveyed farmers plan to plant nearly 92 million acres of corn, exceeding pre-report estimates by over 1 million acres and representing a 3.42 million acre increase from the previous year. Soybean acreage, on the other hand, is expected to remain the same as 2022, at 87.5 million acres, driven by strong demand for domestic crush and biofuel production. The largest increase in planted acreage is projected for wheat, rising to 49.9 million acres in 2023 from 45.7 million acres in 2022. This increase is attributed to tight U.S. stocks and high global prices, influenced in part by the conflict in Ukraine.

Projected plantings based on USDA data:

- Corn: 91.9 million acres, a 4% increase from 2022
- Soybeans: 87.5 million acres, a slight increase from 2022
- All Wheat: 49.9 million acres, a 9% increase from 2022
- Cotton: 11.3 million acres, an 18% decrease from 2022

The projected total acreage for principal crops in 2023 is estimated to be 318.1 million acres, reflecting a 6 million acre increase from 2022 and nearly 1 million acres more than in 2021.

Export outlook

The May 12, 2023, World Agricultural Supply and Demand Estimates (WASDE) forecast for U.S. agricultural exports in fiscal year 2023 was revised down to \$181.0 billion from \$184.5 billion in February. This revision was mainly due to lower forecasts for corn, wheat, beef, and poultry exports. The corn export forecast was reduced by \$2.1 billion, while the wheat export projection was lowered by \$900 million. Overall, grain and feed exports are forecasted to be \$3.3 billion below prior forecast for 2023, while livestock, poultry, and dairy exports are now expected to be \$1.2 billion below prior expectations. However, the soybean export projections were increased by \$300 million. Cotton export projections were increased by \$100 million, while horticultural export expectations remain unchanged. Sugar, tropical product, and tobacco export expectations have been adjusted upward due to higher unit values and stronger-than-expected shipments. The expectations for Ethanol export remain unchanged.

The export forecast for China remains unchanged at \$34.0 billion, while exports to Mexico were adjusted higher by \$500 million. U.S. agricultural imports in fiscal year 2023 are projected to decline by \$1.0 billion to \$198.0 billion. This decrease is mainly attributed to a reduction in horticultural, livestock, dairy, and poultry product imports.

Figure 74: U.S. agricultural trade, fiscal years 2017–2023

Item	2017	2018	2019	2020	2021	2022	Forecast fiscal year	
							2023	
							February	May
<i>Billion dollars</i>								
Exports	144.8	148.6	140.1	139.7	171.7	196.4	184.5	181
Imports	127.2	136.5	141.4	143.4	163.3	194	199	198
Balance	17.6	12.1	-1.3	-3.7	8.4	2.4	-14.5	-17

Source: USDA, Economic Research Service and USDA, Foreign Agricultural Service analysis and forecasts using data from U.S. Department of Commerce, Bureau of the Census.

Competition/opportunity from Brazil

Over the past decade, the Ag sector in Brazil has experienced remarkable growth, with the total planted area increasing by 2% annually between 2010 and 2021, reaching 83.1 million hectares in 2021, according to IBGE. To put this into a perspective, United States had a total of 133 million hectares of planted area in 2020 according to the USDA, while Russia had 80.0 million hectares of planted area in 2020 according to Statista. Additionally, between 1995 and 2021, Brazil experienced rapid growth in the export of row crops such as corn, soybean, wheat,

rice, and oilseeds, with a CAGR of 12.9% over that period. In 2021, Brazil was the second-largest exporter of these commodities, surpassing all other major exporters with the exception of the United States.

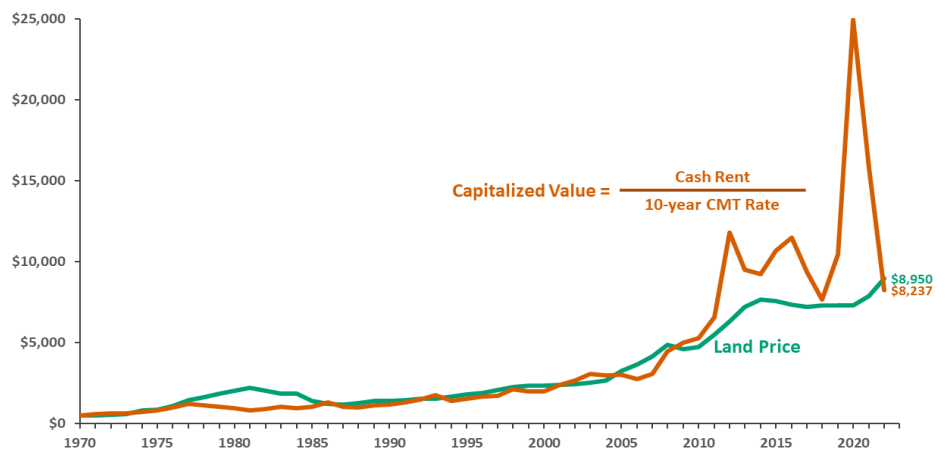
Interest rate impact

Interest rates increased in 2022 and are expected to continue rising in 2023, surpassing the rates observed between 2008 and 2021. The implications for agriculture are threefold, according to reports from farmdoc daily. Firstly, higher interest rates will lead to increased costs of using debt capital, which could put pressure on farmers. Secondly, the breakeven level required to cover investments will rise as interest rates increase, potentially making certain investments unprofitable. Thirdly, asset values, including farmland, will likely experience downward pressure as a result of higher interest rates.

Higher interest rates also raise the breakeven return needed for purchasing assets. For instance, a 5% interest rate on a \$1,000 per acre investment would require a return of \$54 per acre, whereas an 8% interest rate would require a return of \$82 per acre. The \$28 per acre increase could make the investment unprofitable. Furthermore, higher interest rates generally lead to lower asset values, including farmland. Historically, farmland prices have been influenced by cash rents and interest rates. From 2009 to 2021, farmland prices increased, driven by rising rents and declining interest rates. However, with interest rates expected to rise, farmland prices are likely to come in alignment with the capitalized values.

According to the latest FED statement, interest rates are projected to continue increasing in 2023, potentially resulting in lower farmland prices. However, factors such as robust farmland returns, the belief that rising interest rates may be temporary, and the attractiveness of farmland as a hedge against inflation and financial disruptions could stabilize farmland prices. While a significant decline in farmland prices is unlikely in 2023, rising interest rates could exert some downward pressure on farmland values. Farmers need to adapt to higher debt costs, increased breakeven levels, and potential challenges in maintaining asset values in the face of rising interest rates.

Figure 75: Farmland prices and capitalized values in Illinois



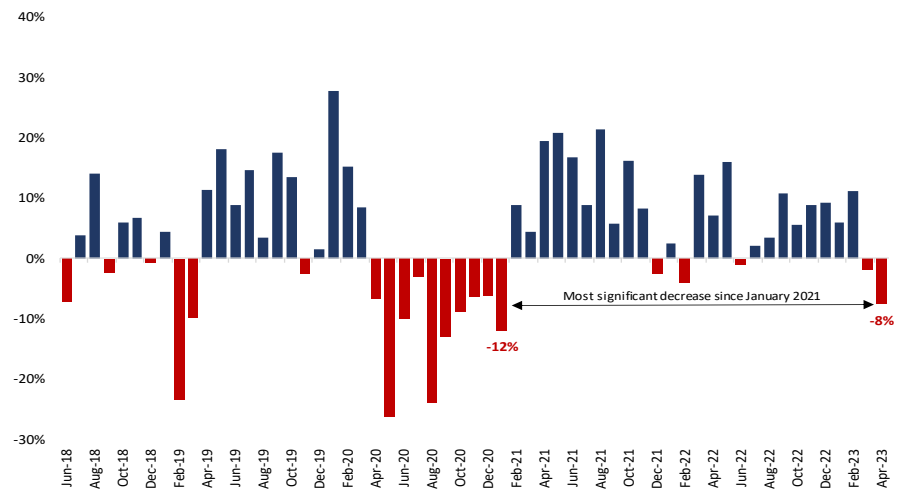
Source: National Agriculture Statistics Service, farmdoc daily, University of Illinois

Equipment leasing data

The Equipment Leasing and Finance Association (ELFA) reported a decline in new business volume for the equipment finance sector in April 2023. The overall new business volume was \$9.7 billion, which represents an 8% decrease compared to April 2022 and a 7% decline from March 2023. However, the cumulative new

business volume for the year-to-date period was up 0.7% compared to the previous year. The percentage of receivables over 30 days decreased slightly to 1.8% in April 2023, compared to 1.9% in the previous month and 2.1% in the same period last year. Charge-offs, on the other hand, increased to 0.33% in April 2023, compared to 0.32% in the previous month and 0.05% in the same period last year. Credit approvals for equipment finance companies improved, with a total of 77.3% in April 2023, up from 75.3% in March. However, the total headcount for equipment finance companies decreased by 1.8% year-over-year. The Equipment Leasing & Finance Association’s Monthly Confidence Index (MCI-EFI) in May 2023 decreased to 40.6 from 47.0 in April, indicating a decline in confidence among industry leaders. A survey conducted by ELFA also revealed some pessimism among business leaders about the short-term outlook for the economy and the equipment finance industry.

Figure 76: Equipment Leasing and Finance Association’s monthly leasing and finance index

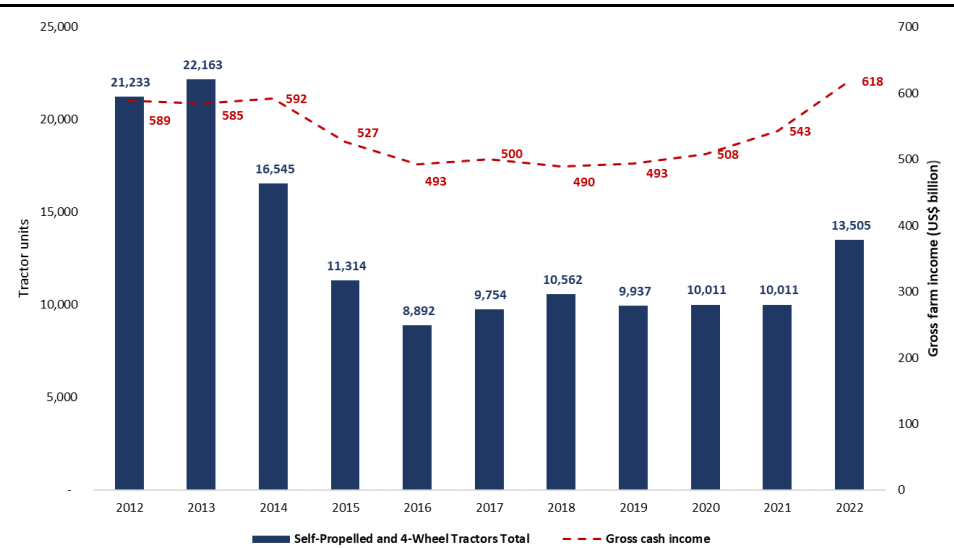


Source: Equipment Leasing and Finance Association, Canaccord Genuity Research

Key Deere equipment categories track farm income

Looking at data for Self-Propelled and 4-Wheel Tractors from Association of Equipment Manufacturers, we see close relationship with gross cash farmer income. The chart below exhibits a 0.76 correlation between aggregate Self-Propelled and 4-Wheel Tractor units vs gross cash farmer income since 2012 (earliest accessible AEM data to CG). With gross cash income poised to decline in 2023, we expect a near-term weakening for farm equipment units. However, with equipment inventories at near record lows and overall farm balance sheets healthy, we believe slowing equipment growth is likely to be temporary. Particularly, as the Russia-Ukraine conflict continues to impact grain export from Europe.

Figure 77: Self-propelled and 4-wheel tractors total vs. gross cash farmer income



Source: AEM, USDA, Canaccord Genuity Research

Data releases impact cycle expectations

Crop commodity prices exhibit strong reactions to USDA reports when these reports introduce significant and unforeseen information into the market. Certain reports have a higher likelihood of causing substantial price fluctuations compared to others. For instance, **Grain Stocks Estimates** are released on a quarterly basis, and since they provide crucial information about scarcity or surplus, they can lead to significant price adjustments. Reports such as **Prospective Planting and Planted Acres** establish a foundational expectation for production in the upcoming marketing year. Any deviations from these expectations or recent historical trends can result in swift price adjustments.

Figure 78: Reports most likely to cause significant movements in market price

Report	Dates	Reason
Grain Stocks	Quarterly	Information about scarcity or surplus of supplies
Prospective Plantings	End of March	Acreage and therefore production estimates
Planted Acres	End of June	Acreage and therefore production estimates
WASDE	October	Some years the Oct report will contain significant revisions from previous estimate
WASDE	January	Final production estimate for the preceding harvest. Sometimes includes an unanticipated revision
Crop Progress Report	Weekly	Condition estimates. Only moves market prices if significant deterioration associated with a drought or flood occurs

Source: "Price Analysis: A Fundamental Approach to the Study of Commodity Prices", Mindy L. Mallory, 2023-05-28, <http://mindymallory.com/PriceAnalysis/>

WASDE (World Agricultural Supply and Demand Estimates) reports issued in October and January are particularly prone to causing rapid price changes. The October report is significant as it tends to provide more precise yield estimates and may involve substantial revisions from the previous month's estimates. Similarly, the January report includes finalized crop production estimates, which can sometimes feature unexpected revisions from earlier estimates.

Crop Progress reports typically impact markets only when there is a rapid deterioration of crop conditions caused by drought or excessive moisture. During years with more typical weather patterns, this report has minimal week-to-week influence on the markets.

Figure 79: Beginning of marketing year by crop

Crop	Beginning of Marketing Year - First Month of Harvest
Corn	September
Soybeans	September
Spring Wheat (Chicago)	August
Winter Wheat (KC)	July

Source: NASS Timetables

Corteva management overview



Chuck Magro, Chief Executive Officer - Chuck Magro joined Corteva on November 1, 2021, after serving as the President and CEO of Nutrien from 2018 until April 2021. Prior to that, from 2014 to 2018, he held the same position at Agrium, which merged with Potash Corporation of Saskatchewan to form Nutrien. Mr. Magro's influence extends beyond his executive roles. He served on the Canadian Pension Plan Investment Board from 2018 to 2022. He also held positions such as Vice Chairman of the International Fertilizer Association, Chair and Board Member of The Fertilizer Institute, Board Steward for the World Economic Forum's Food Systems Initiative, and served on the boards of various organizations related to plant nutrition, food systems, and business councils. Currently, Mr. Magro sits on the boards of CropLife International, Business Roundtable, the IMAGINE Food Collective, Ingredion, and the Central Indiana Corporate Partnership. Additionally, he is a member of the University of Waterloo Dean's Advisory Council. Mr. Magro earned a Bachelor of Applied Science degree in chemical engineering from the University of Waterloo and a Master of Business Administration degree from the University of Windsor.



Dave Anderson, Executive Vice President, Chief Financial Officer - Dave Anderson is currently serving as Corteva's Executive Vice President and Chief Financial Officer. Before joining Corteva, Mr. Anderson served as the Interim CFO at Criteo S.A. and held the positions of CFO and Chief Operating Officer at Nielsen Holdings plc. Prior to that, he was the EVP and CFO of Alexion Pharmaceuticals, following more than a decade as the CFO of Honeywell. Mr. Anderson has also served as the Chief Financial Officer for ITT, Inc., Newport News Shipbuilding Inc., and RJR Nabisco, Inc. He holds a bachelor's degree in Economics from Indiana University and an MBA from the University of Chicago's Booth School. Additionally, Mr. Anderson currently serves on the Board of American Electric Power and previously served on the Board of Cardinal Health. He has received recognition as one of America's Top CFOs in *Institutional Investor* magazine's annual survey of investors and sell-side analysts.



Sam Eathington, Executive Vice President, Chief Technology and Digital Officer - Sam Eathington, Ph.D., joined Corteva in 2020 as Senior Vice President and Chief Technology Officer before assuming his current position of Executive Vice President and Chief Technology and Digital Officer. In his current role, he is responsible for driving digital innovation across the company and leading the global Research and Development organization, which includes the Seed and Crop Protection pipeline. Before joining Corteva, Mr. Eathington served as the Chief Science Officer of The Climate Corporation, a part of Bayer Crop Science. Prior to that, he spent almost 20 years at Monsanto, where he held various roles in quantitative traits and molecular breeding, eventually becoming the Vice President of Global Plant Breeding. He holds a bachelor's degree in agronomy, a Master of Science in soybean breeding and genetics, and a Ph.D. in quantitative genetics and maize breeding from the University of Illinois, Urbana-Champaign.



Tim Glenn, Executive Vice President, Seed Business Unit - Tim Glenn has been serving as the Executive Vice President of the Seed Business Unit at Corteva Agriscience since April 2022. Prior to his current role, Mr. Glenn served as the Chief Commercial Officer for Corteva Agriscience since 2018, overseeing the company's global commercial organization. He also held the position of Vice President of the Global Seed Business Platform, where he played a key role in developing the seed business strategy. Mr. Glenn's career began at Pioneer Hi-Bred in 1991, where he held various marketing roles in seed markets worldwide. He later joined Dow AgroSciences in 1997, taking on responsibilities in sales and business leadership within the Crop Protection and Seeds divisions. After rejoining Pioneer in 2006, Mr. Glenn held leadership positions such as Director of Marketing for North America, Regional Business Director for Latin America and Canada, and Vice President of

Integrated Operations and Commercial Effectiveness for DuPont Pioneer. In 2015, he was appointed President of DuPont Crop Protection. Mr. Glenn holds a Bachelor of Science degree from Iowa State University's College of Agriculture and an MBA from Santa Clara University's Leavey School of Business.

Robert King, Executive Vice President, Crop Protection Business Unit -



Robert King has been serving as the Executive Vice President for the Crop Protection Business Unit at Corteva Agriscience since April 2022. Before joining Corteva, Mr. King served as the Senior Vice President and Chief Integrated Supply Chain Officer at Nouryon, where he led the global integration of the company's supply chain across different business units. Prior to that, he held positions as the Vice President of Global Operations for PPG's industrial segment and Vice President of Global Supply Chain for Nutrien. During his five years at Nutrien, he played a key role in centralizing the company's supply chain. Mr. King also held roles as a Regional Manager at Nutrien and as the Vice President of Nitrogen Operations and Services at Agrium in Canada before the company's transition to Nutrien in 2018. He earned a Bachelor of Science degree in Chemical Engineering from Texas Tech University and an MBA from Texas Woman's University.

Brook Cunningham, Senior Vice President, Chief Strategy Officer -



Brook Cunningham has been serving as Senior Vice President and Chief Strategy Officer at Corteva Agriscience since December 2022. In her role, Ms. Cunningham is responsible for leading the company's efforts in corporate strategy, mergers and acquisitions, sustainability, and competitive intelligence. Before joining Corteva, Ms. Cunningham worked as the Managing Director and Head of Global Agribusiness and Nutrition at Lazard. Prior to Lazard, Ms. Cunningham worked in the M&A Group of Lehman Brothers in New York. She also gained experience at Marsh & McLennan, where she advised corporate and university clients on risk management matters. She holds a Master of Business Administration degree from the Stephen M. Ross School of Business at the University of Michigan, as well as a Bachelor of Arts degree in Economics from the same university.

Cornel B. Fuerer, Senior Vice President, General Counsel -



Cornel B. Fuerer currently serves as the Senior Vice President and General Counsel of Corteva Agriscience. His tenure with DuPont, began in 1995 as an attorney in Switzerland. Over the years, Mr. Fuerer held various legal roles within Dupont, providing counsel to business units across Europe, the Middle East, Africa, and the Asia Pacific region. He has served as Vice President, General Counsel, and Company Secretary of Solae, a food ingredients joint venture between DuPont and Bunge. He also acted as the Corporate Secretary of DuPont. In 2013, Mr. Fuerer relocated to Johnston, Iowa, to serve as DuPont associate general counsel with responsibility for the legal affairs of DuPont Pioneer, a role later expanded to also include responsibilities for DuPont's crop protection business and DuPont's trademark and Canadian legal organizations. Additionally, Mr. Fuerer played a crucial role in obtaining global regulatory approvals for the merger between Dow and DuPont. Mr. Fuerer holds a law degree from the University of Geneva School of Law and a master's degree from the New York University School of Law.

Audrey Grimm, Senior Vice President, Chief HR & Diversity Officer -



Audrey Grimm is currently serving as Corteva's Senior Vice President and Chief Human Resources and Diversity Officer. Ms. Grimm started her career with Dow Chemical in 2004 as a Workforce Planning Specialist in France. Over the years, she held various HR positions of increasing seniority within Dow Chemical's regional and global operations based in Switzerland. In 2015, she moved to the company's agriculture division's headquarters in Indianapolis, where she contributed significantly to HR processes during the DowDuPont merger and the subsequent spin-off of Corteva Agriscience. After returning to Switzerland in 2017, Ms. Grimm assumed leadership of HR for the Europe, Africa, Middle East region. In 2021, she took on additional responsibilities for global culture and ID&E initiatives. Ms. Grimm holds a Master of Human Resources Management degree from EM Strasbourg Business School.

Corteva risks

The following discussion of Corteva's risks does not necessarily reflect all the risks faced by the company, and investors are encouraged to review any relevant filings.

- **Regulatory risk** - If the company is unable to obtain regulatory approvals for its products, its sales could be impacted in certain markets.
- **Competition risk** - Corteva faces significant competition in its operating markets. The number of available products for growers is steadily increasing as new ones are being introduced at a fast pace.
- **Environmental, climate and weather risks** - The adverse effects of seasonal and weather conditions could have a negative impact on Corteva's sales and earnings, as they could potentially lead to a decreased demand for the company's products.
- **Input costs volatility risk** - Corteva's manufacturing requires substantial quantities of raw materials, the costs of which are influenced by global supply and demand dynamics as well as external factors beyond the company's control. Significant variations in input costs may affect the company's operating results from time to time.
- **IP-related risk** - Corteva may encounter challenges in securing intellectual property protection in crucial jurisdictions. Additionally, alterations in government policies and regulations have the potential to affect the level of intellectual property protection provided by those jurisdictions.
- **Risks related to the separation** - As part of the separation process, the company has assumed specific liabilities and agreed to provide indemnification to DuPont and Dow. If the company is obligated to make payments under these indemnities, it may be necessary to allocate cash resources to fulfill these obligations, potentially resulting in adverse effects on its financial performance.

John Deere management overview



John C. May, Chairman and Chief Executive Officer – John C. May became Deere & Company’s CEO in November 2019 and assumed the role of Chairman in May 2020. Prior to becoming CEO, he served as the President and Chief Operating Officer earlier in 2019. Throughout his career at John Deere, Mr. May has taken on various other responsibilities. He held the position of Vice President for the Global Turf & Utility platform and served as the Managing Director of Deere's China operations during a period of substantial growth. Additionally, he managed the company's construction equipment factory in Dubuque, Iowa. He became a member of the senior management team in 2012. Mr. May began his professional journey at John Deere in 1997 after working as a management consultant at KPMG Peat Marwick. He holds a bachelor's degree from the University of New Hampshire and an MBA from the University of Maine.



Joshua A. Jepsen, Senior Vice President & Chief Financial Officer - Josh Jepsen has been serving as the Senior Vice President & Chief Financial Officer since September 2022. Mr. Jepsen's career started in 1999 as an intern at John Deere’s engine factory in Torreon, Mexico. Over the years, he held various positions at the company in internal audit, accounting, and financial analysis across different locations such as the Ottumwa, Augusta, and Waterloo factories, as well as the North American sales and marketing office. He also spent two years as the manager of commercial development for the Construction & Forestry division outside the United States and Canada. In 2013, he relocated to Singapore and became the controller for the company's operations in Asia-Pacific and Africa. Mr. Jepsen transitioned to the investor relations team in 2015 as the manager of investor communications and three years later became the Director of Investor Relations. He was appointed as the Deputy CFO in March 2022. Mr. Jepsen holds degrees in accounting and Spanish from the University of Northern Iowa, as well as an MBA from the Ross School of Business at the University of Michigan.



Ryan D. Campbell, President, Construction & Forestry and Power Systems - Ryan Campbell took on the role of President for the Construction & Forestry Division and Power Systems in May 2022. With 25 years of diverse experience, Mr. Campbell previously held the position of Senior Vice President & Chief Financial Officer, where he held overall responsibility for John Deere's finance functions. In this capacity, he played a key role in the launch of John Deere's Smart Industrial strategy. Mr. Campbell also introduced Leap Ambitions, aligning the company's business and sustainability objectives. Mr. Campbell holds an accounting degree from Simpson College and an MBA from the Booth School of Business at the University of Chicago.



Marc A. Howze, Senior Advisor, Office of the Chairman - Marc Howze took on the role of Senior Advisor in the Office of the Chairman in October 2022. Mr. Howze began his career with the company in 2001 as an attorney and held various legal positions such as senior attorney, senior counsel, and associate general counsel and corporate secretary. He later transitioned to the Ag & Turf division, where he took on roles including business development manager, turf-care factory manager, and global director of the cotton-harvesting product line. In 2012, he became the vice president of global human resources and two years later he assumed responsibility for communications. Mr. Howze was appointed as Senior Vice President and Chief Administrative Officer in 2016 and took on the roles of Group President, Lifecycle Solutions, and Chief Administrative Officer in 2020. Prior to joining John Deere, Howze served as an officer in the U.S. Army, reaching the rank of major. Howze holds a bachelor's degree from the University of Michigan-Dearborn, a juris doctor from the University of Michigan Law School, and an MBA from the Fuqua School of Business at Duke University. He is a member of the Illinois and Michigan Bar Associations and serves on the boards of the Executive Leadership Council and Nationwide Mutual Insurance Company.



Mary K.W. Jones, Senior Vice President, General Counsel and Worldwide Public Affairs - Mary K. W. Jones has been serving as the Senior Vice President, General Counsel, and Worldwide Public Affairs at Deere & Company since January 2019. Ms. Jones began her career at Deere & Company in 1997 as an attorney. She spent over 10 years in Global Law Services, where she held various roles including Senior Counsel, Assistant General Counsel, and Associate General Counsel. In March 2008, she was appointed Corporate Secretary and Associate General Counsel. Later that year, she joined the Corporate Human Resources organization as Director of Regional Human Resources and Shared Services. In March 2010, she became Vice President of Global Human Resources. In January 2013, prior to her current position, she was appointed as Senior Vice President and General Counsel. Ms. Jones earned her bachelor's degree from Truman State University and obtained her Juris Doctorate degree with high distinction from the University of Iowa College of Law, where she was a member of the Editorial Board of the Iowa Law Review.



Rajesh Kalathur, President, John Deere Financial, and Chief Information Officer - Raj Kalathur has been serving as the President of John Deere Financial and Chief Information Officer (CIO) of Deere & Company since 2019. With over 26 years of extensive experience in operations, sales and marketing, and finance, Kalathur leads the team dedicated to ensuring that customers of John Deere equipment worldwide have access to competitive financing solutions. Under his leadership, the loan portfolio of John Deere Financial has reached approximately \$50 billion, and the net income for the division reached \$881 million in 2021. As CIO, he has led the company's digitalization journey, overseeing a period of digital transformation and the implementation of an agile IT operating model. Under Mr/ Kalathur's guidance, John Deere Financial has been recognized as one of Monitor Daily's Innovative Companies and was nominated for the Prometheus Creative Technology Solution of the Year. Mr. Kalathur holds a master's degree in industrial engineering from the University of Alabama and an MBA from the Booth School of Business at the University of Chicago. Mr. Kalathur is a member of the Iowa Business Council, where he serves as the chairperson of the Career Ready Workforce Committee.



Felecia Pryor, Senior Vice President & Chief People Office - Felecia Pryor has been serving as the Senior Vice President and Chief People Officer since August 2022. Ms. Pryor brings nearly two decades of experience in human resources and related areas from her previous roles at major industrial companies. She held executive positions such as Executive Vice President and Chief Human Resources Officer at BorgWarner, Inc., and Vice President of Human Resources at the Morse business unit within the same company. During her 16-year tenure at Ford Motor Company, Ms. Pryor served as the global human resources director and held executive roles in Thailand and China. She also held various human resources and labor relations positions at Ford assembly plants and the company's financial services unit. Ms. Pryor earned a bachelor's degree in criminal justice from Valdosta State University, a master's degree in public administration from Florida Atlantic University, and a law degree from Western Michigan University. She is licensed to practice law in the state of Michigan and currently serves on the board of directors of Lincoln Educational Services.



Cory J. Reed, President, Worldwide Agriculture & Turf Division: Production and Precision Ag, Americas and Australia - Cory Reed has been serving as the President of the Worldwide Agriculture & Turf Division for Production and Precision Ag at John Deere since June 2020. Mr. Reed joined John Deere in 1998 and has held various leadership positions within the company. His previous roles include President of John Deere Financial, Senior Vice President of the Intelligent Solutions Group, Senior Vice President of Global Marketing Services, marketing manager for large tractors, and sales manager positions in Europe and the United States. Throughout his career, Mr. Reed has played a pivotal role in establishing John Deere's precision farming platform. In 2019, under Mr. Reed's leadership, the

company's R4038 Self-Propelled Sprayer received the "Best at CES - Sustainability Award" at the Consumer Electronics Show. Reed earned a bachelor's degree in finance from Miami University in Oxford, Ohio, and a Juris Doctorate degree from the Ohio State University College of Law.



Justin R. Rose, President, Lifecycle Solutions, Supply Management, and Customer Success Deere & Company - Justin Rose has been serving as the President of Lifecycle Solutions, Supply Management, and Customer Success at Deere & Company since October 2022. Before joining Deere, Mr. Rose worked for 20 years at Boston Consulting Group (BCG). During his time at BCG, he held senior positions, including senior partner and managing director. Mr. Rose collaborated with Deere on several significant projects and played a key role in the development of the smart-industrial strategy and operating model. In his most recent position at BCG, Mr. Rose led the North American industrial-goods practice and was a member of the global leadership team. Mr. Rose earned bachelor's degrees in mathematics and economics, and an MBA from Northwestern University.



Markwart von Pentz, President, Worldwide Agriculture and Turf Division: Small Ag and Turf Care, Europe, CIS, Asia, and Africa - Mark von Pentz has been serving as the President, Worldwide Agriculture & Turf Division, Small Ag and Turf, responsible for the European, CIS, Asian, and African markets at Deere & Company since June 2020. He joined John Deere in 1990 and has gained extensive experience in sales, marketing, and management. During his leadership, Mr. von Pentz led a significant overhaul of the company's flagship tractor product line, resulting in notable recognition from engineering organizations and the high-tech community. In 2019, John Deere received the gold medal from the German agricultural society DLG at the AGRITECHNICA show, the leading trade show for agricultural technology and innovation. Prior to his current role, Mr. von Pentz held various leadership positions within Deere, including Senior Vice President of Marketing & Product Support for Europe, Africa, and the Middle East; Vice President of North American Ag Marketing; and roles in market development and customer focus projects. Von Pentz holds an advanced degree in business administration from Hamburg University.

John Deere risks

The following discussion of DE's risks does not necessarily reflect all the risks faced by the company, and investors are encouraged to review any relevant filings

- **Macroeconomic risk** – High unemployment, rising interest rates, and more cautious consumer spending could adversely impact the demand for John Deere's products and services.
- **Commodity prices volatility risk** - Decreased agricultural commodity prices have a direct impact on farmers' incomes, which can have a negative effect on the sales of agricultural equipment and lead to increased credit losses.
- **Environmental, climate and weather risks** - Adverse weather conditions, especially during the planting and early growing season, can have a substantial impact on the purchasing decisions made by John Deere's customers, especially those purchasing agricultural and turf equipment.
- **Financial risks** – Due to the exposure of John Deere's equipment operations and financial services segment to interest rate risks, fluctuations in interest rates can lead to a decrease in equipment demand, negatively impact interest margins, restrict access to capital markets, and increase borrowing expenses. Additionally, as the financial services segment provides financing for a substantial portion of the company's global sales, unfavorable economic conditions in the financial industry could have a significant impact on the company's operations and financial performance.
- **Manufacturing and operational risks** – Fluctuations in the availability and cost of specific raw materials, components, and finished goods have led to substantial disruptions in the supply chain, which have, and could continue to, cause interruptions in production, heightened expenses, and reduced profitability in the sales of the company's products.
- **Legal and regulatory risks** - The company's global operations are subject to international, federal, state, and local laws and regulations. Violation or non-compliance with these laws and regulations could potentially result in elevated costs and liabilities for John Deere's operations.

Figure 80: CTVA FY Income Statement

Fiscal Year End December 31	2018	2019	2020	2021	2022	2023				2023	2024
Income Statement (\$MM)	2018A	2019A	2020A	2021A	2022A	Mar-23	Jun-23	Sep-23	Dec-23	2023E	2024E
(\$ in millions except per unit amounts)						Q1A	Q2E	Q3E	Q4E		
Total Revenue	14,287	13,846	14,217	15,655	17,455	4,884	6,500	3,100	4,216	18,700	19,400
q/q growth						28%	33%	(52.3%)	36%		
y/y growth		(3%)	3%	10%	11%	6%	4%	12%	10%	7%	4%
Cost of Sales	8,449	8,386	8,507	9,220	10,436	2,771	3,494	2,077	2,698	11,041	11,155
Gross Profit	5,838	5,460	5,710	6,435	7,019	2,113	3,006	1,023	1,518	7,659	8,245
Gross Margin	41%	39%	40%	41%	40%	43%	46%	33%	36%	41%	43%
R&D	1,352	1,147	1,142	1,187	1,216	316	365	320	350	1,351	1,500
SG&A	3,042	3,068	3,043	3,209	3,173	726	1,080	650	810	3,266	3,298
Amortization of intangibles	391	475	682	722	702	160	160	160	160	640	640
Total Operating Expense	4,785	4,690	4,867	5,118	5,091	1,202	1,605	1,130	1,320	5,257	5,438
y/y growth		(2%)	4%	5%	(1%)	2%	8%	(1%)	4%	3%	3%
Operating Income	1,053	770	843	1,317	1,928	911	1,401	(107)	198	2,402	2,807
Ol Margin		6%	6%	8%	11%	19%	22%	(3%)	5%	13%	14%
Total Other Operating Expenses	5,595	743	168	(1,029)	502	135	15.0	15.0	14.0	179	70.0
Pre-tax profit (loss)	(4,542)	27	675	2,346	1,426	776	1,386	(122)	184	2,223	2,737
Income tax expense (benefit)	395	1	(81)	524	210	169	319	(28)	42	502	630
Tax rate		4%	(12%)	22%	15%	22%	23%	23%	23%	23%	23%
Income (loss) from continuing operations after income taxes	(4,937)	26	756	1,822	1,216	607	1,067	(94)	141	1,721	2,107
Operating Earnings (Loss) (Non-GAAP)	1,139	1,073	1,127	1,595	1,934	833	1,159	(73)	161	2,079	2,483
(Loss) income from discontinued operations after income taxes			(55)	(53)	(58)	(8)					
Net income attributable to noncontrolling interests	29	13	20	10	11	4	3	3	2	12	12
Net (loss) income attributable to Corteva	(4,966)	13	681	1,759	1,147	595	1,064	(97)	139	1,701	2,095
EPS, basic	(\$6.63)	\$0.02	\$0.91	\$2.39	\$1.59	\$0.84	\$1.49	(\$0.14)	\$0.20	\$2.39	\$2.94
EPS, diluted	(\$6.63)	\$0.02	\$0.91	\$2.37	\$1.58	\$0.83	\$1.49	(\$0.14)	\$0.19	\$2.38	\$2.93
Operating EPS	\$1.52	\$1.43	\$1.50	\$2.15	\$2.67	\$1.16	\$1.62	(\$0.10)	\$0.22	\$2.90	\$3.47
Weighted average basic shares (MM)	749.4	749.5	748.7	735.9	720.8	712.9	712.9	712.9	712.9	712.9	712.9
Weighted average Diluted shares (MM)	749.4	749.5	751.2	741.6	724.5	716.2	716.2	716.2	716.2	716.2	716.2
Operating EBITDA (Non-GAAP)	2,072	1,987	2,087	2,576	3,224	1,231	1,707	204	509	3,650	4,010
Adj. EBITDA Margin	15%	14%	15%	16%	18%	25%	26%	7%	12%	20%	21%

Source: Company reports, Canaccord Genuity estimates. A more detailed financial model, including balance sheet, income statement, and cash flow projections, if available, may be obtained by contacting your Canaccord Genuity Sales Person or the Authoring Analyst, whose contact information appears on the front page of this report.

Figure 81: DE FY Income Statement

Fiscal Year End October 31	2018	2019	2020	2021	2022	2023				2023	2024				
Income Statement (\$MM)	2018A	2019A	2020A	2021A	2022A	Jan-23	Apr-23	Jul-23	Oct-23	2023E	Jan-24	Apr-24	Jul-24	Oct-24	2024E
(\$ in millions except per unit amounts)						Q1A	Q2A	Q3E	Q4E		Q1E	Q2E	Q3E	Q4E	
Equipment Operations Net Sales	33,351	34,886	31,272	39,737	47,916	11,402	16,079	13,855	13,505	54,841	11,422	15,867	13,594	13,417	54,300
Finance and interest income	3,134	3,543	3,450	3,296	3,367	994	1,079	576	605	3,254	690	800	720	780	2,990
Other income	873	829	818	990	1,294	256	229	160	160	805	210	200	195	195	800
Total Consolidated Revenue	37,358	39,258	35,540	44,024	52,577	12,652	17,387	14,591	14,270	58,900	12,322	16,867	14,509	14,392	58,090
q/q growth						(19%)	37%	(16%)	(2%)		(79%)	37%	(14%)	(1%)	
y/y growth	26%	5%	(9%)	24%	19%	32%	30%	3%	(8%)	12%	(3%)	(3%)	(1%)	1%	(1%)
Cost of Sales	25,573	26,793	23,678	29,120	35,342	7,940	10,737	9,394	9,302	37,373	8,026	10,611	9,225	9,249	37,111
Gross Profit	8,778.7	9,092	8,514	11,691	14,049	3,810	5,648	4,627	4,378	18,462	3,606	5,466	4,544	4,353	17,968
Gross Margin	26%	26%	27%	29%	28%	32%	34%	33%	32%	33%	31%	34%	33%	32%	33%
R&D	1,658	1,783	1,644	1,587	1,912	495	547	569	571	2,182	493	675	580	576	2,324
Equipment Operations SG&A	2,935	3,031	2,878	2,887	3,137	783	935	886	970	3,575	789	1,079	929	921	3,718
Total Equipment Operating Expense	4,593	4,814	4,522	4,474	5,049	1,278	1,482	1,455	1,541	5,757	1,281	1,754	1,509	1,497	6,041
Equipment Operations Operating Income	4,186	4,278	3,992	7,217	9,000	2,532	4,166	3,171	2,836	12,706	2,324	3,712	3,035	2,856	11,927
OI Margin			13%	18%	19%	22%	26%	23%	21%	23%	20%	23%	22%	21%	22%
Equipment Operations Interest expense	298	256	329	368	389	101	103	200	200	604	150	150	150	150	600
Equipment Operations Other operating expenses	315	299	280	179	348	53	85			138					
Total Equipment Operations Other Expense	913	891	857	764	1,036	277	362	200	200	1,039	150	150	150	150	600
Equipment Operations Pre-tax profit (loss)	3,273	3,387	3,135	6,453	7,964	2,255	3,804	2,971	2,636	11,667	2,174	3,562	2,885	2,706	11,327
Equipment Operations tax expense	1,869	689	898	1,387	1,719	483	974	773	685	2,915	565	926	750	704	2,945
Tax Rate	57%	20%	29%	21%	22%	21%	26%	26%	26%	25%	26%	26%	26%	26%	26%
Equipment Operations Net (loss) income	1,404	2,698	2,237	5,066	6,245	1,772	2,830	2,199	1,951	8,752	1,609	2,636	2,135	2,002	8,382
Equipment Equity in Income (Loss) of Unconsolidated Affiliates	27	21	(50)	18	5		(1)			(1)					
Less: Net income attributable to noncontrolling interests	3	4	2	2	(1)	(2)	(1)			(3)					
Equipment Operations Net Income Attributable to Deere & Company	1,428	2,715	2,185	5,082	6,251	1,774	2,832	2,199	1,951	8,756	1,609	2,636	2,135	2,002	8,382
Financial Service Net Income Attributable to Deere & Company	940	538	566	881	880	185	28	187	230	630	180	237	191	229	837
Consolidated Net Income Attributable to Deere & Company	2,368	3,253	2,751	5,963	7,131	1,959	2,860	2,386	2,181	9,386	1,789	2,873	2,326	2,232	9,219
EPS, basic	\$7.34	\$10.28	\$8.77	\$19.14	\$23.42	\$6.58	\$9.69	\$8.08	\$7.39	\$31.74	\$6.05	\$9.71	\$7.86	\$7.55	\$31.17
EPS, fully diluted	\$7.24	\$10.15	\$8.69	\$18.99	\$23.28	\$6.55	\$9.65	\$8.05	\$7.36	\$31.59	\$6.02	\$9.67	\$7.83	\$7.51	\$31.02
Dividends declared	\$2.58	\$3.04	\$3.04	\$3.61	\$4.36	\$1.20	\$1.25								
Dividends paid		\$2.97	\$3.04	\$3.32	\$4.28	\$1.13	\$1.20	\$1.20	\$1.20	\$4.73	\$1.20	\$1.20	\$1.20	\$1.20	\$4.80
Weighted average basic shares (MM)	322.6	316.5	313.5	311.6	304.5	297.6	295.1	295.1	295.1	295.7	295.7	295.7	295.7	295.7	295.7
Weighted average Diluted shares (MM)	327.3	320.6	316.6	314.0	306.3	299.1	296.5	296.5	296.5	297.2	297.2	297.2	297.2	297.2	297.2

Source: Company reports, Canaccord Genuity estimates. A more detailed financial model, including balance sheet, income statement, and cash flow projections, if available, may be obtained by contacting your Canaccord Genuity Sales Person or the Authoring Analyst, whose contact information appears on the front page of this report.

Appendix: Important Disclosures

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Investment Recommendation

Date and time of first dissemination: June 28, 2023, 05:02 ET

Date and time of production: June 28, 2023, 04:21 ET

Target Price / Valuation Methodology:

Deere & Company - DE

Our \$530 price target is based on 17.1x our F2024 EPS estimate.

Corteva - CTVA

Our \$75 price target is based on 15.2x EV/EBITDA ('24E).

Risks to achieving Target Price / Valuation:

Corteva - CTVA

The following do not necessarily reflect all the risks faced by the company, and investors are encouraged to review any relevant filings: 1) Regulatory risk – Failure to obtain regulatory approvals for its products could impact sales. 2) Competitive risk. 3) Environmental, climate and weather risks. 4) Input costs volatility risk - Significant variations in input costs may affect the company's operating results from time to time. 5) IP-related risk - Corteva may encounter challenges in securing intellectual property protection in crucial jurisdictions. 6) Risks related to the separation - As part of its separation process, the company has assumed specific liabilities and agreed to provide indemnification to DuPont and Dow. It may be necessary to allocate cash resources to fulfill these obligations, potentially resulting in adverse effects on its financial performance.

Deere & Company - DE

The following do not necessarily reflect all the risks faced by the company, and investors are encouraged to review any relevant filings: 1) Macroeconomic risk – High unemployment, rising interest rates, and more cautious consumer spending could adversely impact the demand for John Deere's products and services. 2) Commodity prices volatility risk - Decreased agricultural commodity prices have a direct impact on farmers' incomes, which can have a negative effect on the sales of agricultural equipment and lead to increased credit losses. 3) Environmental, climate and weather risks. 4) Financial risks – Fluctuations in interest rates can lead to a decrease in equipment demand, negatively impact interest margins, restrict access to capital markets, and increase borrowing expenses. 5) Manufacturing and operational risks – Fluctuations in the availability and cost of specific raw materials, components, and finished goods could interruptions in production, heightened expenses, and reduced profitability. 6) Legal and regulatory risks - The company's global operations are subject to international, federal, state, and local laws and regulations.

Distribution of Ratings:

Global Stock Ratings (as of 06/28/23)

Rating	Coverage Universe		IB Clients
	#	%	%
Buy	611	65.42%	22.26%
Hold	135	14.45%	8.89%
Sell	17	1.82%	5.88%
Speculative Buy	158	16.92%	44.94%
	934*	100.0%	

*Total includes stocks that are Under Review

Canaccord Genuity Ratings System

BUY: The stock is expected to generate risk-adjusted returns of over 10% during the next 12 months.

HOLD: The stock is expected to generate risk-adjusted returns of 0-10% during the next 12 months.

SELL: The stock is expected to generate negative risk-adjusted returns during the next 12 months.

NOT RATED: Canaccord Genuity does not provide research coverage of the relevant issuer.

"Risk-adjusted return" refers to the expected return in relation to the amount of risk associated with the designated investment or the relevant issuer.

Risk Qualifier

SPECULATIVE: Stocks bear significantly higher risk that typically cannot be valued by normal fundamental criteria. Investments in the stock may result in material loss.

12-Month Recommendation History (as of date same as the **Global Stock Ratings** table)

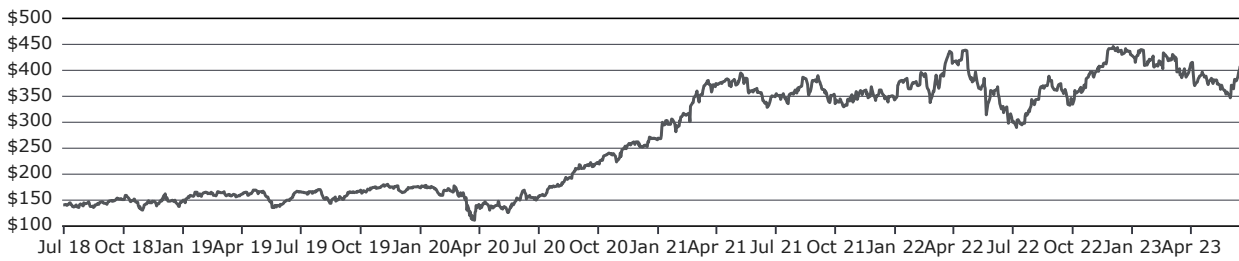
A list of all the recommendations on any issuer under coverage that was disseminated during the preceding 12-month period may be obtained at the following website (provided as a hyperlink if this report is being read electronically) <http://disclosures-mar.canaccordgenuity.com/EN/Pages/default.aspx>

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Deere & Company Rating History as of 06/27/2023



— Closing Price — Price Target
Buy (B); Speculative Buy (SB); Sell (S); Hold (H); Suspended (SU); Under Review (UR); Restricted (RE); Not Rated (NR)

Corteva Rating History as of 06/27/2023



— Closing Price — Price Target
Buy (B); Speculative Buy (SB); Sell (S); Hold (H); Suspended (SU); Under Review (UR); Restricted (RE); Not Rated (NR)

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In line with Article 44(4)(b), MiFID II Delegated Regulation, we disclose price performance for the preceding five years or the whole period for which the financial instrument has been offered or investment service provided where less than five years. Please note price history refers to actual past performance, and that past performance is not a reliable indicator of future price and/or performance.

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