



## TREE NUT R-SHEC TOOL MACHINERY COSTS

Updated: May 30, 2024

### A) Fertilizer Application Machinery Cost List

This list of machinery and associated 2023 per acre is used in the Tree Nut R-SHEC Tool on the **'Nutrient Management'** tab, specifically for calculating the change in machinery costs due to adoption of one or more soil health practices. These machinery costs include overhead (depreciation, interest, insurance, housing, and repair charges) for both the tractor and the implement it is pulling, fuel and lubrication costs, and labor costs. About half of the costs shown below are from the University of Illinois Farmdoc website. The remaining options for fertilizer application are from the Iowa State Custom Rate Survey as they were not available from the University of Illinois. We chose the University of Illinois and Iowa State University as a source for fertilizer application machinery costs because their data set appeared to be the most comprehensive and there is no similar nation-wide list of machinery costs. **Users should evaluate the costs shown for relevancy in their area and adjust as needed**, being careful to document all changes. **Please reference the two University of California Davis almond budgets in the "Ref 1..." and "Ref 2..." tabs; or visit <https://coststudies.ucdavis.edu/current/commodities> to reference pistachio and walnut budgets as well.**

**Note:** If a user needs to add their own equipment and per acre cost, you can add to this list as needed in the clearly identified cells with instructions on the **'Machinery Costs'** tab. We encourage using published prices as those include depreciation, labor, fuel, interest, storage, insurance, etc. Most farmers will undervalue their per acre machinery costs.

Fertilizer & Chemical Application Machinery Costs, 2019, 2021 & 2023 <sup>1,2,3</sup>						
Item	Source	Tractor HP	2019 Costs (\$/Acre)	2021 Costs (\$/Acre)	2023 Costs (\$/Acre)	
Anhydrous ammonia applicator, 27 ft. 6 in.	Univ. Illinois	140	\$17.60	\$18.80	\$26.30	
Anhydrous ammonia applicator, 37 ft. 6 in.	Univ. Illinois	240	\$17.20	\$17.90	\$24.60	
Anhydrous ammonia applicator, 47 ft. 6 in.	Univ. Illinois	290	\$16.50	\$17.10	\$21.10	
Anhydrous ammonia applicator, 52 ft. 6 in. **	Univ. Illinois	370	\$15.30	\$16.40	\$19.10	
Anhydrous ammonia applicator, 62 ft. 6 in.	Univ. Illinois	470	\$14.00	\$14.90	\$18.50	
Fertilizer Application, Anhydrous, injecting, with tool bar	Iowa State Univ.		\$12.50	\$13.40	\$14.75	
Fertilizer Application, Anhydrous, injecting, without tool bar	Iowa State Univ.		\$11.40	\$11.95	\$12.50	
Fertilizer application, dry bulk, applied	Iowa State Univ.		\$5.80	\$6.15	\$6.75	
Fertilizer application, liquid, side dressing	Iowa State Univ.		\$11.35	\$11.35	\$13.00	
Fertilizer application, liquid, spraying	Iowa State Univ.		\$7.30	\$6.80	\$8.00	
Manure Application, liquid, drag line (\$/gal)	Iowa State Univ. <sup>3</sup>		NA	\$0.01	\$0.01	
Manure Application, liquid, injected (\$/gal)	Iowa State Univ. <sup>3</sup>		NA	\$0.01	\$0.02	
Manure Application, loading and spreading solid manure (\$/hr)	Iowa State Univ. <sup>3</sup>		NA	\$141.65	\$110.00	
Self-propelled sprayer (High-crop ready), 80 ft boom	Univ. Illinois	85	\$4.40	\$5.20	\$5.70	

Self-propelled sprayer (High-crop ready), 90 ft boom	Univ. Illinois	85	\$5.30	\$6.40	\$7.30
Self-propelled sprayer (High-crop ready), 100 ft boom	Univ. Illinois	85	\$5.00	\$5.70	\$6.70
Self-propelled sprayer, 120 ft boom	Univ. Illinois	85	\$4.40	\$4.50	\$5.80
<sup>1</sup> University of Illinois at Urbana-Champaign Department of Ag and Consumer Economics. (September 2019, 2021, 2023). <i>Farm Business Management Machinery Cost Estimates: Field Operations</i> . Retrieved on May 21, 2024, from <a href="https://farmdoc.illinois.edu/management#handbook">https://farmdoc.illinois.edu/management#handbook</a>					
<sup>2</sup> Iowa State University Extension and Outreach. (March 2019, 2021, 2023). <i>Ag Decision Maker: 2023 Iowa Farm Custom Rate Survey (File A3-10)</i> . Retrieved on May 21, 2024, from <a href="https://www.extension.iastate.edu/agdm/crops/html/a3-10.html">https://www.extension.iastate.edu/agdm/crops/html/a3-10.html</a>					
<sup>3</sup> Liquid manure application costs were converted from \$/1000 gallons to \$/gallon.					

## B) Price List

Below lists the prices used throughout the Tree Nut R-SHEC Tool, found on the 'Prices' tab in the tool. The prices and costs appearing below are used to calculate costs and savings as data is entered in the tool. **Users should evaluate the prices for relevancy in their area and adjust as needed using the 'Orchard Info' tab** in the tool using the farmer-provided prices tables, or make changes to values on the 'Prices' tab.

Labor Rate - Farm Manager <sup>1</sup>	
Year	\$/hr
2023	\$29.23
<sup>1</sup> U.S. Bureau of Labor Statistics. (May 2023) 45-1011 First-Line Supervisors of Farming, Fishing, and Forestry Workers. Occupational Employment and Wage Statistics. Retrieved May 10 2024, from <a href="https://www.bls.gov/oes/current/oes_nat.htm#45-0000">https://www.bls.gov/oes/current/oes_nat.htm#45-0000</a>	

Tree Nut Prices, California State Averages, 2010-2023 <sup>1</sup>			
<b>Note:</b> The tool uses the 5-year rolling average crop prices. The year-by-year prices are for reference only AND are not adjusted to 2023 values. The 5-year rolling average uses adjusted 2019-2023 values using the Prices Received Index.			
Year	Almond (\$/lb)	Pistachio (\$/lb)	Walnut (\$/lb)
<b>2019-2023</b>	<b>\$2.11</b>	<b>\$2.76</b>	<b>\$0.71</b>
2023	\$1.64	\$2.00	\$0.42
2022	\$1.40	\$2.11	\$0.30
2021	\$1.86	\$2.52	\$0.73
2020	\$1.71	\$2.51	\$0.60
2019	\$2.45	\$2.81	\$0.95
2018	\$2.50	\$2.65	\$0.68
2017	\$2.53	\$1.69	\$1.25
2016	\$2.39	\$1.68	\$0.93
2015	\$3.13	\$3.29	\$0.84
2014	\$4.00	\$3.57	\$1.67
2013	\$3.21	\$3.48	\$1.86
2012	\$2.58	\$2.61	\$1.52
2011	\$1.99	\$1.98	\$1.45
2010	\$1.79	\$2.22	\$1.02
<sup>1</sup> USDA NASS. (2010-2023). <i>Survey - Commodity Price Received: Price Received Measured in \$/lb (California only)</i> . QuickStats. Retrieved May 10, 2024, from <a href="https://quickstats.nass.usda.gov/results/1EE7EA82-BF2D-3153-A98A-49AE038F23EE">https://quickstats.nass.usda.gov/results/1EE7EA82-BF2D-3153-A98A-49AE038F23EE</a>			

<b>Organic Tree Nut Prices, National Averages, 2019-2023<sup>1,2</sup></b>			
<b>Note:</b> The tool uses the 5-year rolling average crop prices. The year-by-year prices are for reference only AND are not adjusted to 2023 values. The 5-year rolling average uses adjusted 2019-2023 values using the Prices Received Index.			
Year	Almond (\$/lb)	Pistachio (\$/lb)	Walnut (\$/lb)
<b>2019-2023</b>	<b>\$4.92</b>	<b>\$3.98</b>	<b>\$1.66</b>
2023*	\$4.06	\$3.39	\$1.22
2022*	\$4.33	\$3.61	\$1.30
2021	\$3.68	\$3.06	\$1.10
2020*	\$4.76	\$3.74	\$1.79
2019	\$4.62	\$3.63	\$1.74
<sup>1</sup> USDA NASS. (2020, October 22). <i>Certified Organic Survey 2019 Summary: Table 8. Certified Organic Tree Nuts Harvested and Value of Sales</i> . Retrieved Feb. 17, 2022, from <a href="http://www.nass.usda.gov/Surveys/Guide_to_NASS_Surveys/Organic_Production/index.php">www.nass.usda.gov/Surveys/Guide_to_NASS_Surveys/Organic_Production/index.php</a>			
<sup>2</sup> USDA NASS. (2022, December 15). <i>Certified Organic Survey 2021 Summary: Table 8. Certified Organic Tree Nuts Harvested and Value of Sales</i> . Retrieved May 10, 2024, from <a href="http://www.nass.usda.gov/Surveys/Guide_to_NASS_Surveys/Organic_Production/index.php">www.nass.usda.gov/Surveys/Guide_to_NASS_Surveys/Organic_Production/index.php</a>			
* 2020, 2022, and 2023 nut prices calculated using the Prices Received Index.			

<b>Fertilizer Prices<sup>1</sup></b>						
<b>Note:</b> Using the 5-year rolling average price column. The year-by-year prices are for reference only AND are not adjusted to 2023 values. The 5-year rolling average uses adjusted 2019-2023 values using the Prices Received Index.						
Fertilizer Element	2019 Prices (\$/lb)	2020 Prices (\$/lb)	2021 Prices (\$/lb)	2022 Prices (\$/lb)	2023 Prices (\$/lb)	5-yr Rolling Avg. Price (\$/lb)
Nitrogen	\$0.34	\$0.34	\$0.72	\$0.83	\$0.60	<b>\$0.63</b>
Phosphorous	\$0.34	\$0.39	\$0.62	\$0.75	\$0.67	<b>\$0.61</b>
Potash	\$0.31	\$0.30	\$0.56	\$0.72	\$0.53	<b>\$0.54</b>
<sup>1</sup> Iowa State University Extension and Outreach. (January 2020-2024). <i>Ag Decision Maker: Estimated Costs of Crop Production in Iowa (File A1-20)</i> . Retrieved on February 6, 2024 from <a href="https://www.extension.iastate.edu/agdm/crops/html/a1-20.html">https://www.extension.iastate.edu/agdm/crops/html/a1-20.html</a>						

<b>Calculated Value (\$/ton) of Reduced Nutrient Loss with Soil Erosion Reduction<sup>1,2</sup></b>			
Fertilizer	lbs/ton of soil <sup>1</sup>	5-yr Rolling Avg. Price (\$/lb) <sup>2</sup>	\$/ton
Nitrogen	2.32	\$0.63	\$1.46
Phosphorous	1.00	\$0.61	\$0.61
<b>Total Combined Fertilizer Benefit (\$/ton)</b>			<b>\$2.07</b>
<sup>1</sup> USDA NRCS. (May 24, 2010). <i>Final Benefit-Cost Analysis for the Environmental Quality Incentives Program (EQIP)</i> . Retrieved on February 22, 2022, from <a href="https://www.blogs.nrcs.usda.gov/Internet/FSE_DOCUMENTS/16/nrcs143_007976.pdf">https://www.blogs.nrcs.usda.gov/Internet/FSE_DOCUMENTS/16/nrcs143_007976.pdf</a>			
<sup>2</sup> Iowa State University Extension and outreach. (January 2020-2024). <i>Ag Decision Maker: Estimated Costs of Crop Production in Iowa (File A1-20)</i> . Retrieved on February 6, 2024 from <a href="https://www.extension.iastate.edu/agdm/crops/html/a1-20.html">https://www.extension.iastate.edu/agdm/crops/html/a1-20.html</a>			
<b>Note:</b> Following page 23 instructions in the USDA NRCS reference above, we estimate the amount of Nitrogen and Phosphorous per ton of eroded soil. They assume topsoil contains 40 lbs of organic matter of which 23.2 lbs is carbon. With an average carbon-nitrogen ratio of 10 to 1, each ton of soil eroded contains 2.32 lbs of nitrogen. The soil also contains 0.05% phosphorous, or one pound per ton of soil.			

<b>Prices Paid Index (PPI): All Items</b>						
<b>United States: 2011=100</b>						
<b>Month</b>	<b>2018</b>	<b>2019</b>	<b>2020</b>	<b>2021</b>	<b>2022</b>	<b>2023</b>
January	108.6	110.8	111.0	113.4	131	140.3
February	109.5	110.7	110.6	114.8	133.1	140.3
March	109.7	110.9	109.7	116.0	135	140.3
April	109.3	111.4	108.5	117.0	137.6	139.7
May	109.7	110.8	108.6	117.9	137.8	138.9
June	109.4	110.3	108.8	119.2	138.3	138.5
July	109.5	110.4	109.5	120.4	138.7	138.6
August	109.6	109.6	109.8	121.0	139.3	138.7
September	109.5	109.2	110.3	121.3	138.8	138.7
October	110.0	109.9	111.2	122.7	138.6	138.8
November	110.1	110.0	112.0	123.7	138.8	138.3
December	110.3	110.0	112.8	125.2	138.4	137.6
<b>Average Annual PPI</b>	<b>109.6</b>	<b>110.3</b>	<b>110.2</b>	<b>119.4</b>	<b>137.1</b>	<b>139.1</b>
<b>% PPI Change from previous year</b>		<b>1.01</b>	<b>1.00</b>	<b>1.08</b>	<b>1.15</b>	<b>1.01</b>
USDA NASS. (Ongoing). <i>Prices Paid: Indexes for All Items and Production Items by Month - United States</i> . Retrieved February 6, 2024 from <a href="https://www.nass.usda.gov/Charts_and_Maps/Agricultural_Prices/index.php">https://www.nass.usda.gov/Charts_and_Maps/Agricultural_Prices/index.php</a>						

<b>Prices Received Index (PRI): Crop Production</b>						
<b>United States: 2011=100</b>						
<b>Month</b>	<b>2018</b>	<b>2019</b>	<b>2020</b>	<b>2021</b>	<b>2022</b>	<b>2023</b>
January	78.4	78	82.2	88.3	105	118
February	86.3	84.3	86.6	97.2	114.6	120.6
March	87.7	87.2	87.4	98.5	120.9	118.7
April	88.4	85.2	86.3	105.1	122.9	126.2
May	88.7	84	86.7	106.1	124.2	120.6
June	89.8	89.5	89.5	107.5	126.9	120.7
July	86.5	88.9	88.4	106.8	125	119.5
August	89.3	89.4	89.9	110.5	128.2	117.7
September	87.8	88.4	93.1	108.8	126.8	112.4
October	80	83	87.8	106.4	121.6	103.9
November	83.9	84.8	91.6	107.5	127	101
December	87.4	86	91.2	106.6	128.7	101.7
<b>Average Annual PPI</b>	<b>86.2</b>	<b>85.7</b>	<b>88.4</b>	<b>104.1</b>	<b>122.7</b>	<b>115.1</b>
<b>% PPI Change from previous year</b>		<b>0.99</b>	<b>1.03</b>	<b>1.18</b>	<b>1.18</b>	<b>0.94</b>
USDA NASS. (Ongoing). <i>Prices Received: Indexes for Ag, Crop, and Livestock Production by Month - United States</i> . Retrieved February 6, 2024, from <a href="https://www.nass.usda.gov/Charts_and_Maps/Agricultural_Prices/index.php">https://www.nass.usda.gov/Charts_and_Maps/Agricultural_Prices/index.php</a>						