

ATTACHMENT B

Case Study – Idle Land



DEFINITION

Idle land is any land where an orchard has been removed and not replaced with another crop. Depending on how it is managed, idled land can be bare or weeds or other vegetation can proliferate to various degrees. Land is mapped as idle if it presents as a field that has been managed in the past as an agricultural field but does not currently have a crop growing on it. The Land IQ land use dataset classifies idle as fallow in the current year, and idle lands as short-term (idle for two or three consecutive years) and long-term (idle for four or more years). For example, idle can include:

- Bare field, tilled so that little/no vegetation grows during the water year
- Winter/spring weed growth that is tilled in or mowed, with field bare after
- Field not tilled or mowed the entire water year or multiple water years, covered in vegetation

Therefore, land classed as “idle” can be in various conditions, and land condition and its associated water use may be difficult to determine from land use and evapotranspiration data alone.

WATER USE

The consumptive use of idle land depends on the vegetative cover and the type of precipitation year. Idle land in the Vina Subbasin used about 9.9 inches of water, on average, from January to October, 2025. This value takes into account different water year types and various levels of vegetative cover.

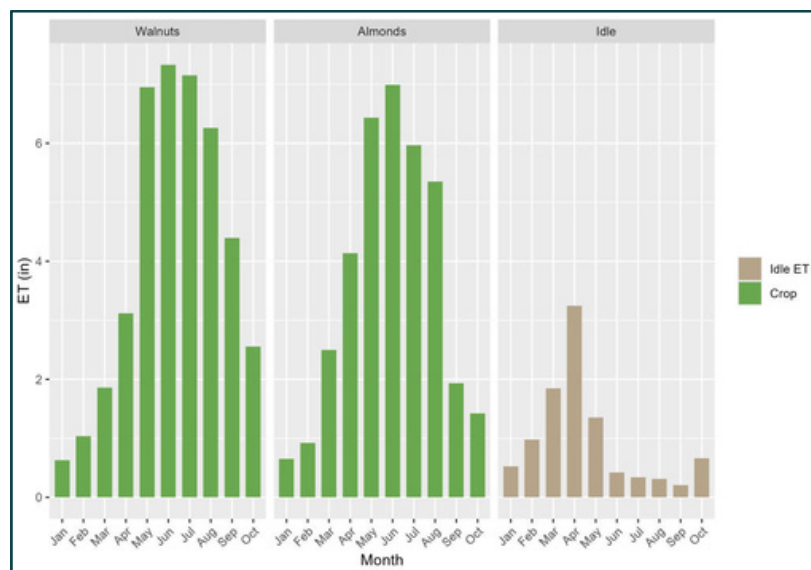
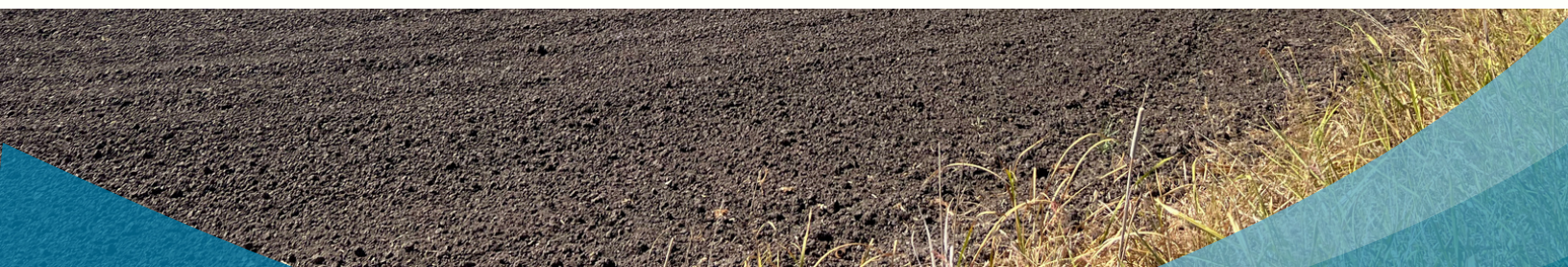


Figure 1. Mean ET by Crop Type January - October





CONSIDERATIONS

Idled agricultural lands dominate human-caused dust sources in California (causing over 80% of total emissions) and has expanded in recent years because of water shortages. These dust emissions are associated with public health issues and impacts on regional climate. In addition to increasing risk of respiratory and cardiovascular diseases, dust can carry infectious soil-dwelling fungal spores. Dust impacts regional climate by absorbing radiation and influencing winds, exacerbating heat waves, and affecting water resources availability (precipitation, snow melt timing) (Adebiyi et al. 2025).

Idle land is also susceptible to degradation from soil erosion especially when it is unirrigated during periods of high evaporative demand. The severity of soil erosion caused by wind depends on soil type and fetch, or the distance that wind has to blow or pick up before being obstructed. Soils with high water infiltration capacity and/or organic matter are less prone to soil erosion. Silts, fine sands, and some clays are more susceptible. The longer the fetch, Soil erosion results in reduced fertility and soil microbial diversity. In turn, these impacts reduce agricultural productivity and resilience to extreme climate events by decreasing infiltration and buffering against other changes in soil physical and chemical conditions.

FINANCIAL ANALYSIS

The financial analysis considers an almond orchard that is removed and the land is idled for a period of 1, 2, or 3 years prior to replanting to almonds. During the idle period, idle land falls under the idle land strategies described in the definition section. This creates water savings and may also provide soil or other agronomic benefits.

An analysis was developed to compare the net income (revenue minus costs) to the grower when immediately replanting versus delaying replanting by 1, 2, or 3 years.

- **Revenues.** The almond orchard is removed in Year 0. If it is immediately replanted to almonds the next season (Year 1), it will produce the first viable crop in Year 3 (3rd leaf). It would generate positive net cash flow in Year 6. Delaying replanting by 1 year means the block produces its first crop in Year 4 and generates positive net cash flow in Year 7. Similar logic applies to delaying replanting by 2 or 3 years. For delayed replanting, the land is idled as bare soil.
- **Costs.** The almond orchard is removed in Year 0 at a cost of approximately \$2,800 per acre for tree removal, grinding trees, composting, ripping for root removal, disc, and roll. Replanting costs include trees, spraying, and field establishment. These costs are incurred in Year 1 if the block is immediately replanted, and they are incurred in Years 2, 3, or 4 if replanting is delayed. The only costs associated with idling land are overhead costs.
- **Other considerations.** Delaying replanting in the idle land scenario may or may not provide additional soil and pest management benefits. There are potential negative effects including soil erosion, increased dust emissions, and declines in soil fertility. However, anecdotal reports from growers report more vigorous orchard growth and better production when replanting is delayed at least one year



Extended Orchard Replacement (EOR) Case Study Idle Land



FINANCIAL ANALYSIS

- Water savings.** Almond orchards have an average evapotranspiration (ET) of 3.03 acre-feet per acre over the lifetime of a 25-year orchard. The idle land ET is assumed to be 0.83 acre-feet per acre. Total ET savings are 2.20, 4.40, and 6.60 acre-feet per acre in the 1-year, 2-year, and 3-year replanting delay scenarios. The corresponding cost of water savings are \$309, \$303, and \$297 per acre-foot of water saved, respectively.

The analysis illustrates representative costs, yields, and returns. Actual costs and returns will vary by farming operation. A grower, or a grower that is also a handler, will have different access to cash and borrowing that may affect operations and outcomes. Almond prices fluctuate based on market conditions and would affect the values in this analysis. The analysis applies to representative almond yields and a price of \$2.25/lb. for almonds.¹

An enterprise farm budget was developed for this scenario that includes all costs and revenues: removal and replanting, cash costs, capital costs, and overhead. Table 1 summarizes the costs (excluding all overhead) for expenses that would be incurred under each option. By delaying replanting, the grower defers the outlay for stand establishment and instead incurs lower costs to maintain the idle land. Delaying replanting postpones the initial bearing years and break-even net cash flow.

Table 1. Summary of Selected Almond Orchard Replanting Costs for the Winter Wheat–Grain Scenario

Metric	No Delay \$/ac	1-Year Delay \$/ac	2-Year Delay \$/ac	3-Year Delay \$/ac
Year 0	Removal (\$2,800)	Removal (\$2,800)	Removal (\$2,800)	Removal (\$2,800)
Year 1	Replant (\$6,300)	-	-	-
Year 2	1st leaf	Replant (\$6,300)	-	-
Year 3	2nd leaf	1st leaf	Replant (\$6,300)	-
Year 4	3rd leaf	2nd leaf	1st leaf	Replant (\$6,300)
Orchard Cash Flow Break Even	Year 6	Year 7	Year 8	Year 9

¹Additional analysis, discussion, and sensitivity scenarios are available in the full Vina Subbasin Extend Orchard Replacement Program Report.



Extended Orchard Replacement (EOR) Case Study Idle Land



FINANCIAL ANALYSIS

The financial analysis shows the cost implications of delayed replanting; the timing of income (revenues) and costs to the grower changes based on the delay interval. A financial model was developed to calculate the break-even payment that would be required to make the grower indifferent between immediately replanting, or delaying replanting by a period of 1, 2, or 3 years. A program offering incentive payments for delayed replanting would offer a payment equal to or greater than this amount.

Almond Incentive Payment (per acre) Idle Land	
1-year	\$639
2-year	\$1,253
3-year	\$1,844

Incentive Payment Sensitivity (per acre) Idle Land	
Low Almond Incentive Payment	\$366/ac
High Almond Incentive Payment	\$1,094/ac

The results presented are sensitive to key cost and market factors applied in this analysis, particularly commodity price and net returns from alternative uses/crops during the replanting period. To better understand how these factors affect the incentives across different scenarios, a sensitivity analysis incorporates alternative prices, replanting costs, and yield into the payment calculations. These are presented as a range of low and high for one-year payments.

The idle land scenario may or may not provide soil benefits. For example, yield may decline if erosion had a severe impact on soil health. However, anecdotal reports from growers report more vigorous orchard growth and better production when replanting is delayed at least one year. An additional financial analysis was developed to calculate the break-even yield or production increase for the grower, where the greater yields for the future orchard offset the initial cost of delaying replanting. Figure 1 summarizes the results from this analysis.

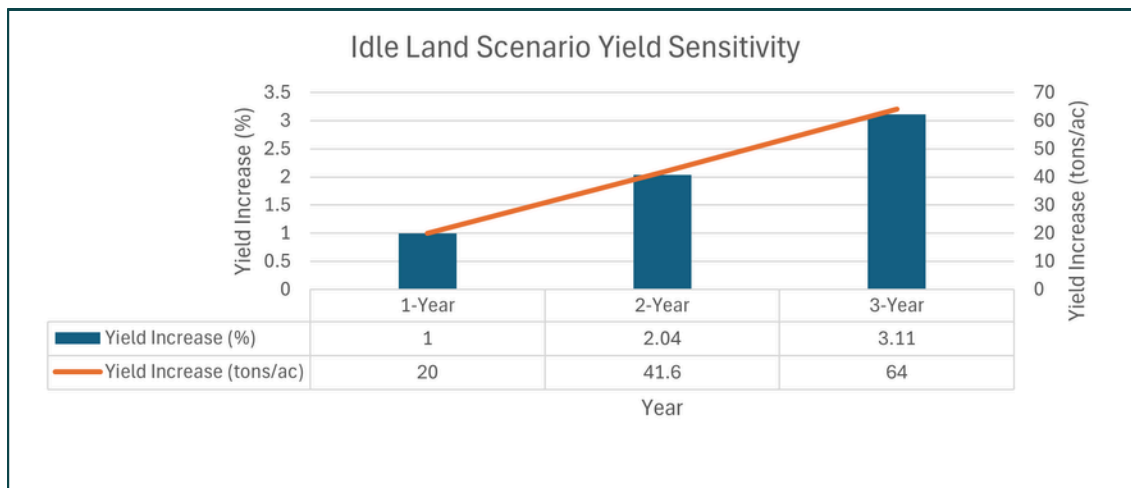


Figure 2. Yield Impact Sensitivity Analysis for the Idle Land Scenario





FINANCIAL ANALYSIS

For the idle land scenario, yield for a one-year delay would need to be 1% higher throughout the 25-year life of the orchard to offset the upfront expense of delayed replanting. This corresponds to a ~20 tons per acre yield increase. This required yield increase rises with the number of years delayed due to the higher overhead expenses and orchard production delay.

Table 2 presents a complete financial outlay including revenue, cost, and yield impacts. Assuming yield is unchanged, there is a cost to delay replanting, and additional idle land year costs, which are captured by the declining value measure. The financial model then calculates the Breakeven Yield Factor, which is the yield increase necessary for value to be equal between the No delay scenario, and the corresponding number of years of delay. That is, the cost of delaying replanting is offset by the benefits of increased yields by the factors shown in Table 2 (between 0.997% and 3.113%, depending on the scenario).

Table 2. Breakeven Analysis for the Idle Land Scenario

Metric	No Delay \$/ac	1-Year Delay \$/ac	2-Year Delay \$/ac	3-Year Delay \$/ac
Value at Yield Factor = 1.00	\$4,818	\$4,179	\$3,565	\$2,974
Annual Costs				
Cover crop planting cost	\$0	\$0	\$0	\$0
Basic idle year costs	\$0	\$364	\$364	\$364
Cover crop revenue	\$0	\$0	\$0	\$0
Net Revenue	\$0	(\$364)	(\$728)	(\$1,092)
One-Time Costs				
Removal	\$2,800	\$2,800	\$2,800	\$2,800
Replant	\$6,300	\$6,300	\$6,300	\$6,300
Breakeven Yield Factor	1	1.00997	1.02035	1.03113



ATTACHMENT C

Case Study – Abandoned Orchards

DEFINITION

Abandoned orchards are orchards that are not irrigated or managed to produce a commercial crop but have not been removed. These orchards may still access water from stored soil moisture, shallow groundwater or capillary action from connected sources such as rivers or canals.

In the Land IQ land use dataset, stressed and abandoned orchards are classified into four categories depending on the level and duration of stress. Therefore, orchards classified as abandoned can represent a range of conditions. For this analysis, orchards were considered abandoned if they were in Tier 3.

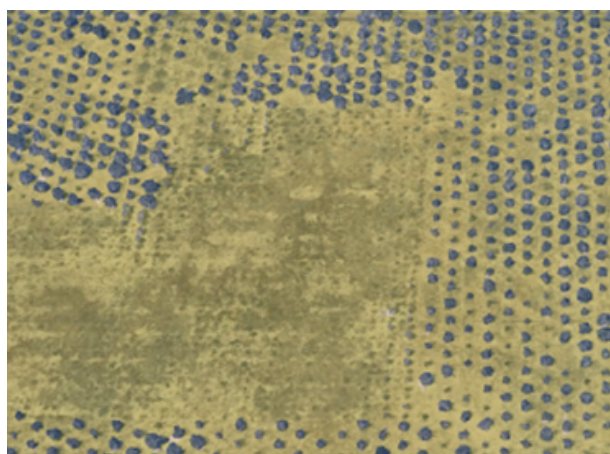
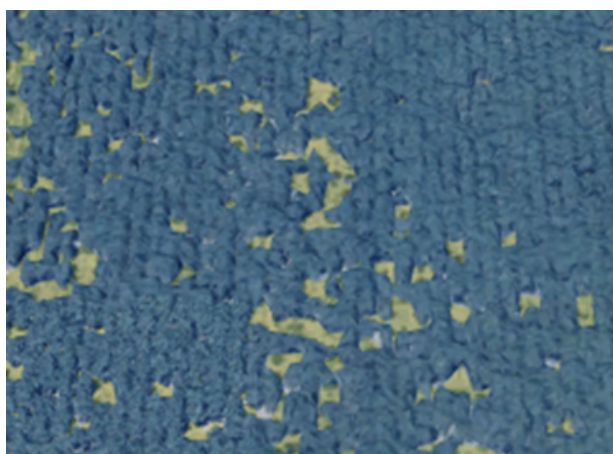
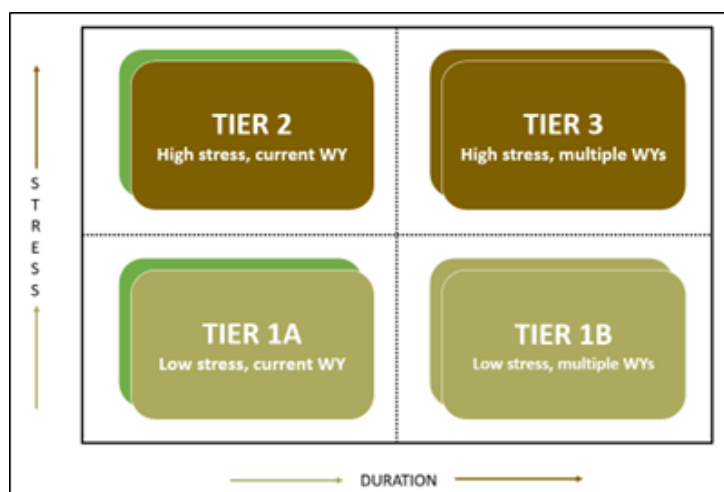


Figure 1. Examples of Tier 1A Abandoned Orchard (Left) and Tier 3 Abandoned Orchard (Right)



Extended Orchard Replacement (EOR) Case Study Abandoned Orchards



WATER USE

Abandoned almond orchards in the Vina Subbasin consumed about 16.5 inches of water and abandoned walnut orchards used about 16.1 inches of water from January to October, 2025.

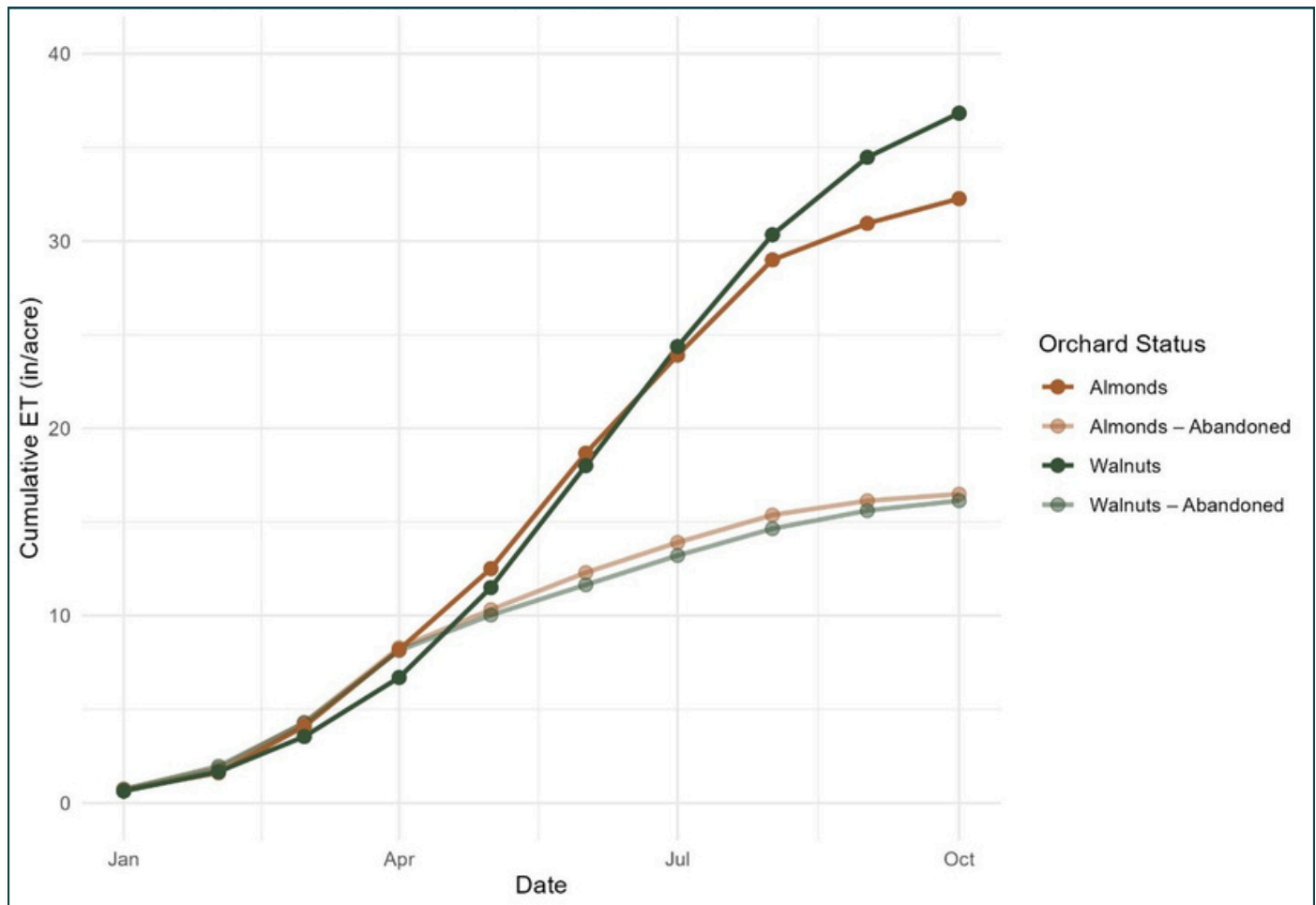


Figure 1. 2025 season-long ET of orchards vs abandoned orchards.



Extended Orchard Replacement (EOR) Case Study

Abandoned Orchards



CONSIDERATIONS

Abandoned orchard blocks have increased in California statewide because of water scarcity and low market prices. These blocks can harbor pests like navel orangeworm, rodents, and weeds that can spread to neighboring orchards. Assembly Bill 732 was signed into law in October 2025 to provide county agricultural commissioners with authority to issue civil penalties up to \$500 per acre, and up to \$1,000 if landowners fail to take action on abandoned orchards. The bill requires counties to issue a notice before penalties are levied. Landowners who take action based on resources such as UC Cooperative Extension and the UC Statewide Integrated Pest Management Program can void fines. The bill will remain in effect until 2035, allowing a decade for counties to assess its impact.

FINANCIAL ANALYSIS

The financial analysis considers an almond orchard that is abandoned after its term of 25 years. Once abandoned, the orchard is not irrigated, managed, or removed. Pursuant to the passage of AB 732, the county agricultural commissioner may levy penalties ranging from \$500 to \$1,000 per acre for orchards that are left abandoned.

An analysis was developed to compare the revenues (none) and costs over a period of 1, 2, or 3 years following orchard abandonment against those of other management options.

- **Revenues.** Since the orchard is abandoned, the model assumes it is not replanted or harvested. There is no revenue generated in the subsequent production cycle.
- **Costs.** The only costs associated with the abandoned orchard scenario are the overhead costs. This analysis assumes minimal overhead costs to cover property taxes and insurance at \$190 per acre. There are no irrigation, removal, or management costs.
- **Other considerations.** Leaving the orchard abandoned poses a threat to soil and agronomic health, especially for neighboring orchards and fields. Abandoned orchards foster the growth and spread of pests, including navel orangeworm, rodents, and weeds. Another practice a grower might engage in is 'mothballing', which is defined as maintaining a non-producing orchard with minimal, critical inputs to allow for a rapid return to production in the future. This practice accomplishes objectives including a reduction in per-acre cost, and lowering pest and disease pressure, but is not considered for this case study.
- **Water savings.** Almond orchards have an average annual evapotranspiration (ET) of 3.03 acre-feet per acre over a 25-year orchard. Abandoned orchards have an average ET of 1.36 acre-feet per acre each year. Water savings are estimated at 1.67 acre-feet per acre per year.

The financial analysis shows the additional cost to delay orchard removal. Depending on the length of orchard removal delay, the timing for when removal costs and penalties (if applicable) realized by the grower changes. Under the abandoned orchard scenario, civil penalties are levied against producers who are in violation of AB 732. This means they



Extended Orchard Replacement (EOR) Case Study

Abandoned Orchards



FINANCIAL ANALYSIS

have left an orchard neglected or abandoned, and it poses a public nuisance due to the presence of pests. The policy states that growers must first receive notice of the nature of their violation and then have thirty (30) days to rectify the issue. If it is fixed within this period, the penalty is removed. If the grower does not take good faith action within forty-five (45) days, however, the penalty amount is authorized to increase to up to \$1,000 per acre. Examples of actions that would rectify the issue include removal and fallowing, a minimal management scenario, or a return to full production.

Penalties for Abandoned Orchard Scenario

30-days
\$0 - 500
45 days
\$1,000

The analysis illustrates representative costs, yields, and returns. Actual costs and returns will vary by farming operation. A grower, or a grower that is also a handler, will have different access to cash and borrowing that may affect operations and outcomes. Almond prices fluctuate based on market conditions and would affect the values in this analysis. The analysis applies to representative almond yields and a price of \$2.25/lb. for almonds.¹ Table 1 compares the financial outlay between several management decisions a producer could make at the end of the previous orchard's productive life (Year 0).

Table 2. Selected Cost Comparison by Management Scenario in Year 0

Cost	Abandoned Orchard \$/ac	Minimal Management \$/ac	Bare Ground Idle* \$/ac	Replanting \$/ac
Removal	\$0	\$0	\$2,800	\$2,800
Overhead	\$190	\$364	\$364	\$364
Management	\$0	\$200	\$0	\$430
Irrigation	\$0	\$0	\$0	\$4,000
Replanting	\$0	\$0	\$0	\$2,300
Subtotal	\$190	\$564	\$3,164	\$9,894
Penalty Fine**	\$500-\$1,000	\$0	\$0	\$0
Total	\$690 to \$1,190	\$564	\$3,164	\$9,894

¹Additional analysis, discussion, and sensitivity scenarios are available in the full Vina Subbasin Extend Orchard Replacement Program Report.

*The penalty fine is only imposed if the producer is in noncompliance; the amount depends on the timeline and grower response following notice of violation.

**For more information, refer to the Bare Ground Fallow Case Study



ATTACHMENT D

Case Study – Winter Cover Crop

Extended Orchard Replacement (EOR) Case Study



Winter Cover Crop - Winter Mix

DEFINITION

Here an EOR winter cover crop is assumed to be a cool-season grass and legume mixture that is planted in the fall, terminated in the spring and incorporated for green manure.

WATER USE

Winter mix cover crops consumed 11.9 inches of water during their growing season in 2025. For months when the land was idle, another 1.9 inches of water was consumed, for a total of 13.8 inches of consumed water for this land use January to October 2025.

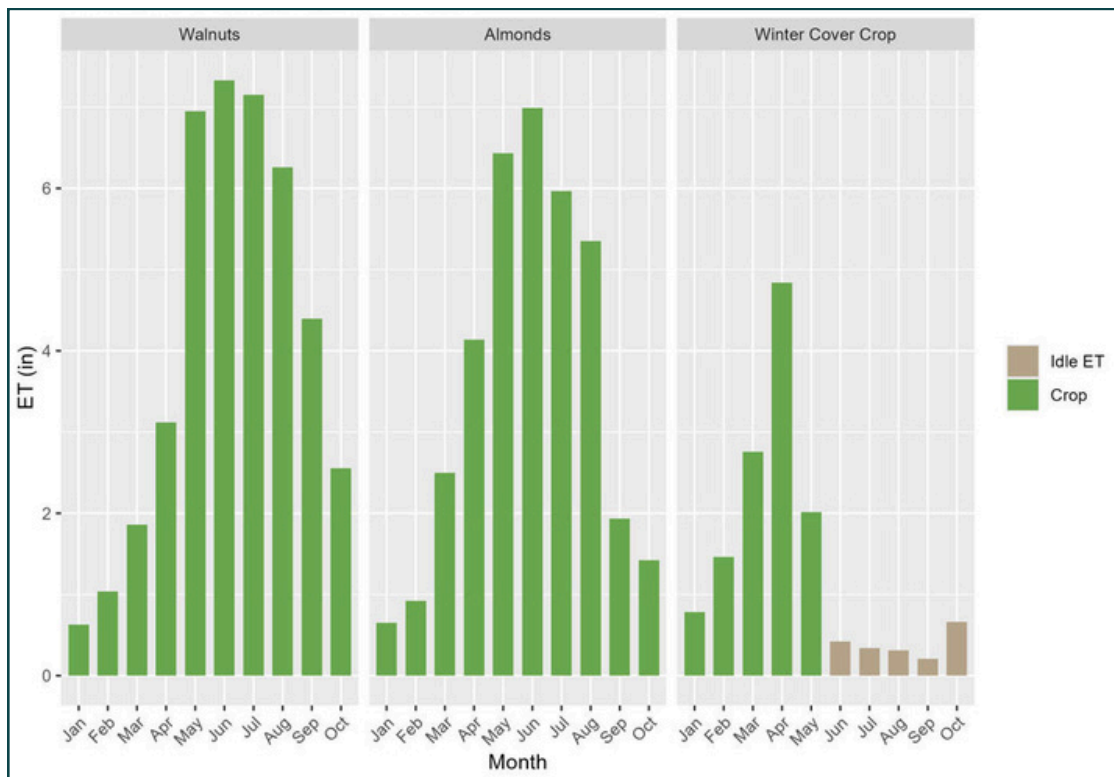


Figure 1. Mean ET by Crop Type January - October





CONSIDERATIONS

Potential benefits from cover crops include:

Reduced :

- Compaction and cracking
- Soil erosion
- Nitrogen losses
- Pest nematodes

Improved :

- Pollinator forage
- Beneficial insects and other organisms
- Water infiltration
- Orchard access during rainy periods
- Salt management (including sodium)
- Soil nitrogen
- Carbon and organic matter content
- Weed management (especially brassicas)

In orchards where whole orchard recycling has been used, cover crops may help regulate soil moisture and prevent nitrogen getting tied up in orchard residue.

Challenges with cover crops include increased gopher populations (particularly in clover-heavy mixes) and the potential for cover crops to act as a pest vector for susceptible adjacent plantings.

Different cover crops can be used to accomplish different goals and no single cover crop can achieve all of them. Some cover crops might be better for nematode inhibition while others might be better suited for improving water infiltration. Importantly, fall-planted cover crops use winter rains as their main source of water, and once those rains stop in the spring, cover crops can compete with orchard crops for stored soil moisture and applied water if they are not terminated in a timely manner.

FINANCIAL ANALYSIS

The financial analysis considers an almond orchard that is removed and the land is left idle for a period of 1, 2, or 3 years prior to replanting to almonds. During the idle period, under this scenario, a winter wheat mix is planted as a fall cover crop. This creates water savings and provides some soil and other agronomic benefits. An analysis was developed to compare the net income (revenue minus costs) to the grower when immediately replanting versus delaying replanting by 1, 2, or 3 years.

- **Revenues.** The almond orchard is removed in Year 0. If it is immediately replanted to almonds the next season (Year 1) it will produce the first crop in Year 3 (3rd leaf). It would generate positive net cash flow in Year 6. Delaying replanting by 1 year means the block produces its first crop in Year 4 and generates positive net cash flow in Year 7. Similar logic applies to delaying replanting by 2 or 3 years. For delayed replanting, a winter wheat mix crop is planted, however not harvested. Although there is no harvesting or revenue generated from the sale of this cover crop, there is benefit in the form of reduced cost for soil amendment at \$15 per acre in the first two years of orchard planting.





FINANCIAL ANALYSIS

- **Costs.** The almond orchard is removed in Year 0 at a cost of approximately \$2,800 per acre for tree removal, grinding trees, composting, ripping for root removal, disc, and roll. Replanting costs include trees, spraying, and field establishment. These costs are incurred in Year 1 if the block is immediately replanted, and are incurred in Years 2, 3, or 4 if replanting is delayed. For delayed replanting, the winter mix cover crop is planted at cost of \$156 per acre, excluding overhead.
- **Other considerations.** Delaying replanting may provide additional soil and pest management benefits. Depending on the duration of the replanting period some growers may be able to avoid fumigation for nematode management. Other soil and crop productivity benefits may provide cost savings through reduced amendments or increased productivity.
- **Water savings.** Almond orchards average evapotranspiration (ET) of 3.03 acre-feet per acre over a 25-year orchard. The cover crop ET is assumed to be 1.15 acre-feet per acre. ET savings are 1.88, 3.76, and 5.64 acre-feet per acre in the 1-year, 2-year, and 3-year replanting delay scenarios. The corresponding cost of water savings are \$423, \$415, and \$408 per acre-foot of water saved, respectively.

The analysis illustrates representative costs, yields, and returns. Actual costs and returns will vary by farming operation. A grower, or a grower that is also a handler, will have different access to cash and borrowing that may affect operations and outcomes. Almond prices fluctuate based on market conditions and would affect the values in this analysis. The analysis applies to representative almond yields and a price of \$2.25/lb. for almonds.¹

An enterprise farm budget was developed for this scenario that includes all costs and revenues: removal and replanting, cash costs, capital costs, overhead, and crop revenue from the orchard. Table 1 summarizes the expenses (excluding all overhead) that would be incurred under each option. By delaying replanting the grower defers the outlay for stand establishment and instead incurs lower costs to plant the winter mix cover crop. Delaying replanting delays the initial bearing years and break-even net cash flow.

¹Additional analysis, discussion, and sensitivity scenarios are available in the full Vina Subbasin Extend Orchard Replacement Program Report.



Extended Orchard Replacement (EOR) Case Study

Winter Cover Crop - Winter Mix



FINANCIAL ANALYSIS

Table 1. Summary of Selected Almond Orchard Replanting Costs for the Winter Mix Cover Crop Scenario

Metric	No Delay \$/ac	1-Year Delay \$/ac	2-Year Delay \$/ac	3-Year Delay \$/ac
Year 0	Removal (\$2,800)	Removal (\$2,800)	Removal (\$2,800)	Removal (\$2,800)
Year 1	Replant (\$6,300)	Wheat (\$156)	Wheat (\$156)	Wheat (\$156)
Year 2	1st leaf	Replant (\$6,300)	Wheat (\$156)	Wheat (\$156)
Year 3	2nd leaf	1st leaf	Replant (\$6,300)	Wheat (\$156)
Year 4	3rd leaf	2nd leaf	1st leaf	Replant (\$6,300)
Orchard Cash Flow Break Even	Year 6	Year 7	Year 8	Year 9

The financial analysis shows the additional cost to delay replanting. The timing of income (revenues) and costs to the grower changes. A financial analysis was developed to calculate the break-even payment that would be required to make the grower indifferent between immediately replanting, or delaying replanting by a period of 1, 2, or 3 years. A program offering incentive payments for delayed replanting would offer a payment equal to or greater than this amount.

Almond Incentive Payment (per acre) Winter Mix Cover Crop

1-year	\$790
2-year	\$1,551
3-year	\$2,282

Incentive Payment Sensitivity (per acre) Winter Mix Cover Crop

Low Almond Incentive Payment	\$327/ac
High Almond Incentive Payment	\$1,056/ac

The results presented are sensitive to key cost and market factors applied in this analysis, particularly commodity price and net returns from alternative uses/crops during the replanting period. To better understand how these factors affect the incentives across different scenarios, a sensitivity analysis incorporates alternative prices, replanting costs, and yield into the payment calculations. These are presented as a range of low and high for one-year payments.





FINANCIAL ANALYSIS

The winter mix crop may provide soil benefits, which would potentially boost orchard yield. Anecdotal reports from growers report more vigorous orchard growth and better production when delaying replanting. An additional financial analysis was developed to calculate the break-even yield/production increase for the grower where the greater yields for the future orchard offset the initial cost of delaying replanting. Figure 1 summarizes the results from this analysis.

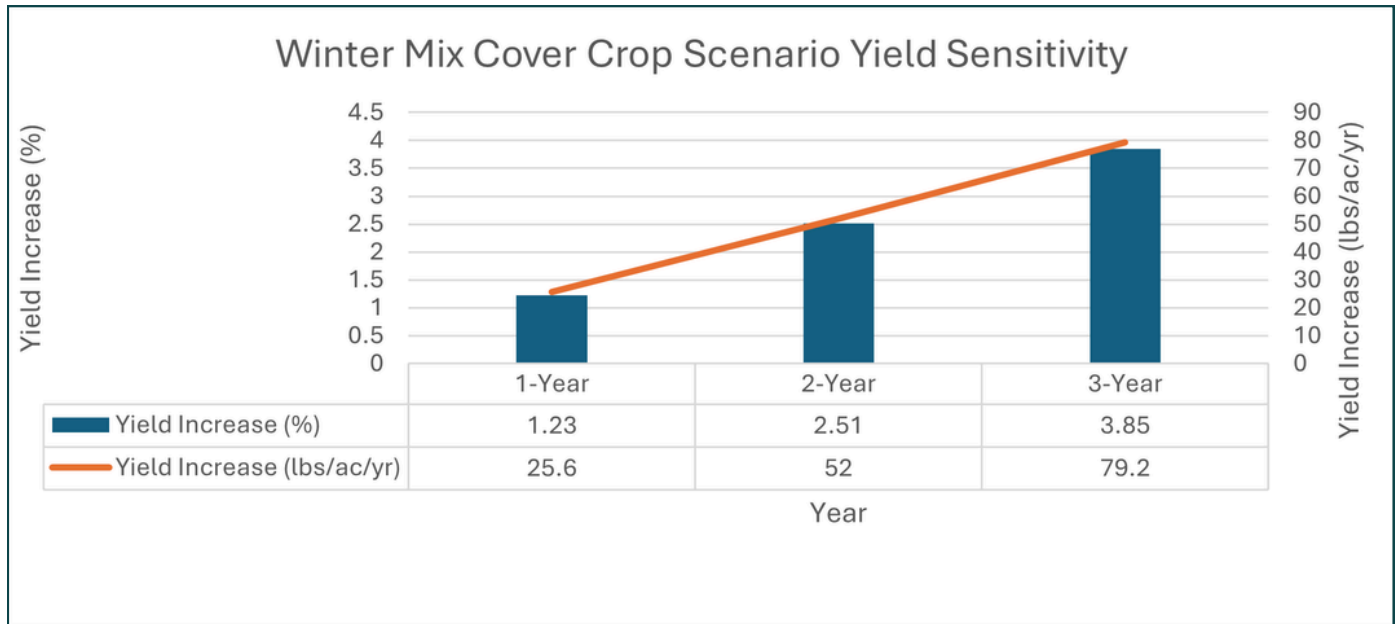


Figure 2. Yield Impact Sensitivity Analysis for the Winter Mix Cover Crop Scenario



Extended Orchard Replacement (EOR) Case Study

Winter Cover Crop - Winter Mix



FINANCIAL ANALYSIS

For the winter mix, yield for a one-year delay would need to be 1.23% higher throughout the 25-year life of the orchard to offset the upfront expense of delayed replanting. This corresponds to a 25.6 lbs per acre yield increase. This required yield increase rises with the number of years delayed due to the higher overhead expenses and orchard production delay.

Table 2 presents a financial summary including revenue, cost, and yield impacts. Assuming yield is unchanged, there is a cost to delay replanting, and additional fallow year costs, which are captured by the declining value measure. The financial model then calculates the Breakeven Yield Factor, which is the yield increase necessary for value to be equal between the No delay scenario, and the corresponding number of years of delay.

Table 2. Breakeven Analysis for the Winter Cover Crop Scenario

Metric	No Delay \$/ac	1-Year Delay \$/ac	2-Year Delay \$/ac	3-Year Delay \$/ac
Value at Yield Factor = 1.00	\$4,864	\$4,073	\$3,313	\$2,582
Annual Costs				
Cover crop planting cost	\$0	\$156	\$156	\$156
Basic fallow year costs	\$0	\$364	\$364	\$364
Cover crop revenue	\$0	\$0	\$0	\$0
Cover crop benefit	\$0	\$30	\$30	\$30
Net Revenue	\$0	(\$490)	(\$1,010)	(\$1,530)
One-Time Costs				
Removal	\$2,800	\$2,800	\$2,800	\$2,800
Replant	\$6,300	\$6,300	\$6,300	\$6,300
Breakeven Yield Factor	1	1.01234	1.02518	1.03853



ATTACHMENT E

Case Study – Winter Grain Crop

DEFINITION

Winter wheat is planted as a fall cover crop in October/November. The grower harvests the crop at maturity for grain in July the following year. This approach offers winter soil benefits from decomposing roots and field residue. In addition, the grain crop produces modest revenue.

WATER USE

Winter grain crops consumed 11.9 inches of water during their growing season in 2025. For months when the land was idle, another 1.9 inches of water was consumed, for a total of 13.8 inches of consumed water for this land use January to October 2025.

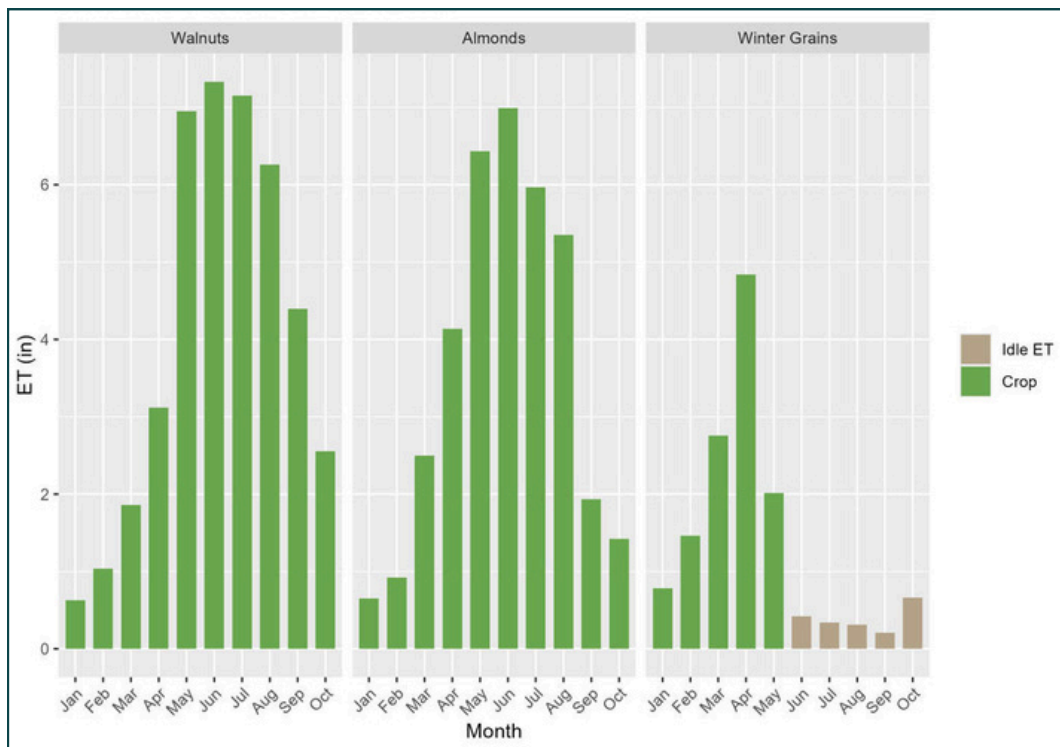


Figure 1. Mean ET by Crop January - October





CONSIDERATIONS

Potential benefits from cover crops include:

- Improved:
 - Pollinator forage
 - Beneficial insects and other organisms
 - Water infiltration
 - Orchard access during rainy periods
 - Salt management (including sodium)
 - Soil nitrogen
 - Carbon and organic matter content
 - Weed management (especially brassicas)
- Reduced:
 - Compaction and cracking
 - Soil erosion
 - Nitrogen losses
 - Pest nematodes

In orchards where whole orchard recycling has been used, cover crops may help regulate soil moisture and prevent nitrogen getting tied up in orchard residue.

Challenges with cover crops include increased gopher populations (particularly in clover-heavy mixes) and the potential for cover crops to act as pest vectors for susceptible adjacent plantings.

Different cover crops can be used to accomplish different goals, and no single cover crop can achieve all of them. Some cover crops might be better for nematode inhibition while others might be better suited for improving water infiltration. Importantly, fall-planted cover crops use winter rains as their main source of water, and once those rains stop in the spring, cover crops can compete with orchard crops for stored soil moisture and applied water if they are not terminated in a timely manner.



Extended Orchard Replacement (EOR) Case Study

Winter Grain Crop



FINANCIAL ANALYSIS

The financial analysis considers an almond orchard that is removed and the land is left idle for a period of 1, 2, or 3 years prior to replanting to almonds. During the idle period, under this scenario, winter wheat for grain is planted as a fall cover crop. This creates water savings, provides a harvestable crop, and provides some soil and other agronomic benefits. An analysis was developed to compare the net income (revenue minus costs) to the grower when immediately replanting versus delaying replanting by 1, 2, or 3 years.

- **Revenues.** The almond orchard is removed in Year 0. If it is immediately replanted to almonds the next season (Year 1) it will produce the first crop in Year 3 (3rd leaf). It would generate positive net cash flow in Year 6. Delaying replanting by 1 year means the block produces its first crop in Year 4 and generates positive net cash flow in Year 7. Similar logic applies to delaying replanting by 2 or 3 years. For delayed planting, a winter wheat crop is planted and harvested for grain generating around \$570 per acre in revenue.
- **Costs.** The almond orchard is removed in Year 0 at a cost of approximately \$2,800 per acre for tree removal, grinding trees, composting, ripping for root removal, disc, and roll. Replanting costs include trees, spraying, and field establishment. These costs are incurred in Year 1 if the block is immediately replanted, and are incurred in Years 2, 3, or 4 if replanting is delayed. For delayed replanting, winter wheat is planted at cost of \$460 per acre, excluding overhead.
- **Other considerations.** Delaying replanting may provide additional soil and pest management benefits. Depending on the duration of the replanting period some growers may be able to avoid fumigation for nematode management. Other soil and crop productivity benefits may provide cost savings through reduced amendments or increased productivity.
- **Water savings.** Almond orchards average evapotranspiration (ET) of 3.03 acre-feet per acre over a 25-year orchard. The cover crop ET is assumed to be 1.15 acre-feet per acre. ET savings are 1.88, 3.76, and 5.64 acre-feet per acre in the 1-year, 2-year, and 3-year replanting delay scenarios. The corresponding cost of water savings are \$341, \$335, and \$328 per acre-foot of water saved, respectively.

The analysis illustrates representative costs, yields, and returns. Actual costs and returns will vary by farming operation. A grower, or a grower that is also a handler, will have different access to cash and borrowing that may affect operations and outcomes. Almond prices fluctuate based on market conditions and would affect the values in this analysis. The analysis applies to representative almond yields and a price of \$2.25/lb. for almonds.¹

¹Additional analysis, discussion, and sensitivity scenarios are available in the full Vina Subbasin Extend Orchard Replacement Program Report.



Extended Orchard Replacement (EOR) Case Study

Winter Grain Crop



FINANCIAL ANALYSIS

An enterprise farm budget was developed for this scenario that includes all costs and revenues: removal and replanting, cash costs, capital costs, overhead, and crop revenue from the orchard or winter wheat-grain. Table 1 summarizes the expenses (excluding all overhead) that would be incurred under each option. By delaying replanting the grower defers the outlay for stand establishment and instead incurs lower costs to plant the winter wheat-grain cover crop. The grain harvest offsets some of these costs. Delaying replanting delays the initial bearing years and break-even net cash flow.

Table 1. Summary of Selected Almond Orchard Replanting Costs for the Winter Wheat-Grain Scenario

Metric	No Delay \$/ac	1-Year Delay \$/ac	2-Year Delay \$/ac	3-Year Delay \$/ac
Year 0	Removal (\$2,800)	Removal (\$2,800)	Removal (\$2,800)	Removal (\$2,800)
Year 1	Replant (\$6,300)	Wheat (\$460)	Wheat (\$460)	Wheat (\$460)
Year 2	1st leaf	Replant (\$6,300)	Wheat (\$460)	Wheat (\$460)
Year 3	2nd leaf	1st leaf	Replant (\$6,300)	Wheat (\$460)
Year 4	3rd leaf	2nd leaf	1st leaf	Replant (\$6,300)
Orchard Cash Flow Break Even	Year 6	Year 7	Year 8	Year 9

The financial analysis shows the cost implications of delayed replanting; the timing of income (revenues) and costs to the grower changes based on the delay interval. A financial model was developed to calculate the break-even payment that would be required to make the grower indifferent between immediately replanting, or delaying replanting by a period of 1, 2, or 3 years. A program offering incentive payments for delayed replanting would offer a payment equal to or greater than this amount.

Almond Incentive Payment (per acre) Winter Grain Crop

1-year	\$531
2-year	\$1,042
3-year	\$1,533





FINANCIAL ANALYSIS

Incentive Payment Sensitivity (per acre) Winter Grain Crop

Low Almond Incentive Payment
\$258/ac

High Almond Incentive Payment
\$987/ac

The results presented are sensitive to key cost and market factors applied in this analysis, particularly commodity price and net returns from alternative uses/crops during the replanting period. To better understand how these factors affect the incentives across different scenarios, a sensitivity analysis incorporates alternative prices, replanting costs, and yield into the payment calculations. These are presented as a range of low and high for one-year payments.

The winter wheat-grain cover crop may provide soil benefits, which would potentially boost orchard yield. Anecdotal reports from growers report more vigorous orchard growth and better production when delaying replanting. An additional financial analysis was developed to calculate the break-even yield/production increase for the grower where the greater yields for the future orchard offset the initial cost of delaying replanting.

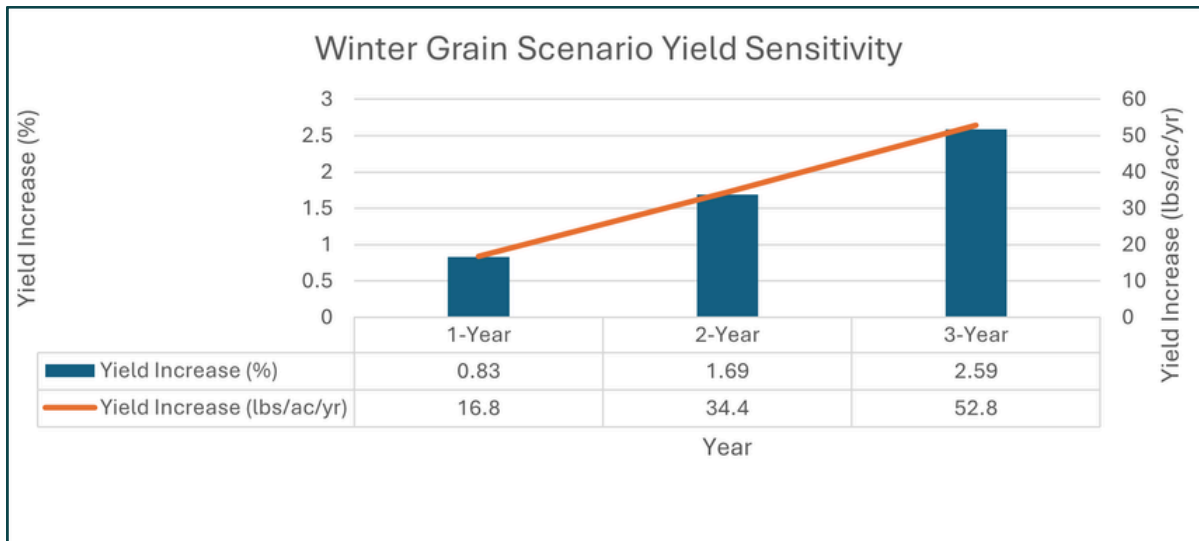


Figure 2. Yield Impact Sensitivity Analysis for the Winter Wheat-Grain Scenario

For the winter wheat-grain scenario, yield for a one-year delay would need to be 0.83% higher throughout the 25-year life of the orchard to offset the upfront expense of delayed replanting. This corresponds to a 16.8 lbs per acre yield increase. This yield increase rises with the number of years delayed due to the higher overhead expenses and orchard production delay.



Extended Orchard Replacement (EOR) Case Study

Winter Grain Crop



FINANCIAL ANALYSIS

Table 2 presents a financial summary including revenue, cost, and yield impacts. Assuming yield is unchanged, there is a cost to delay replanting, and additional fallow year costs, which are captured by the declining value measure. The financial model then calculates the Breakeven Yield Factor, which is the yield increase necessary for value to be equal between the No delay scenario, and the corresponding number of years of delay.

Table 2. Breakeven Analysis for the Winter Wheat-Grain Scenario

Metric	No Delay \$/ac	1-Year Delay \$/ac	2-Year Delay \$/ac	3-Year Delay \$/ac
Value at Yield Factor = 1.00	\$4,818	\$4,287	\$3,776	\$3,285
Annual Costs				
Cover crop planting cost	\$0	\$460	\$460	\$460
Basic fallow year costs	\$0	\$364	\$364	\$364
Cover crop revenue	\$0	\$572	\$572	\$572
Net Revenue	\$0	(\$252)	(\$504)	(\$756)
One-Time Costs				
Removal	\$2,800	\$2,800	\$2,800	\$2,800
Replant	\$6,300	\$6,300	\$6,300	\$6,300
Breakeven Yield Factor	1	1.00829	1.01691	1.02588



ATTACHMENT F

Case Study – Spring Sudan Grass Crop

Extended Orchard Replacement (EOR) Case Study

Spring/Summer Sudan/Sorghum Cover Crop



DEFINITION

Here an EOR grassy cover crop (a sorghum-Sudangrass hybrid) is planted in the spring and terminated through mowing and discing at the end of the growing season.

WATER USE

Spring sudan grasses consumed 14.2 inches of water during their growing season in 2025. For months when the land was idle, another 2.9 inches of water was consumed, for a total of 17.1 inches of consumed water for this land use January to October 2025.

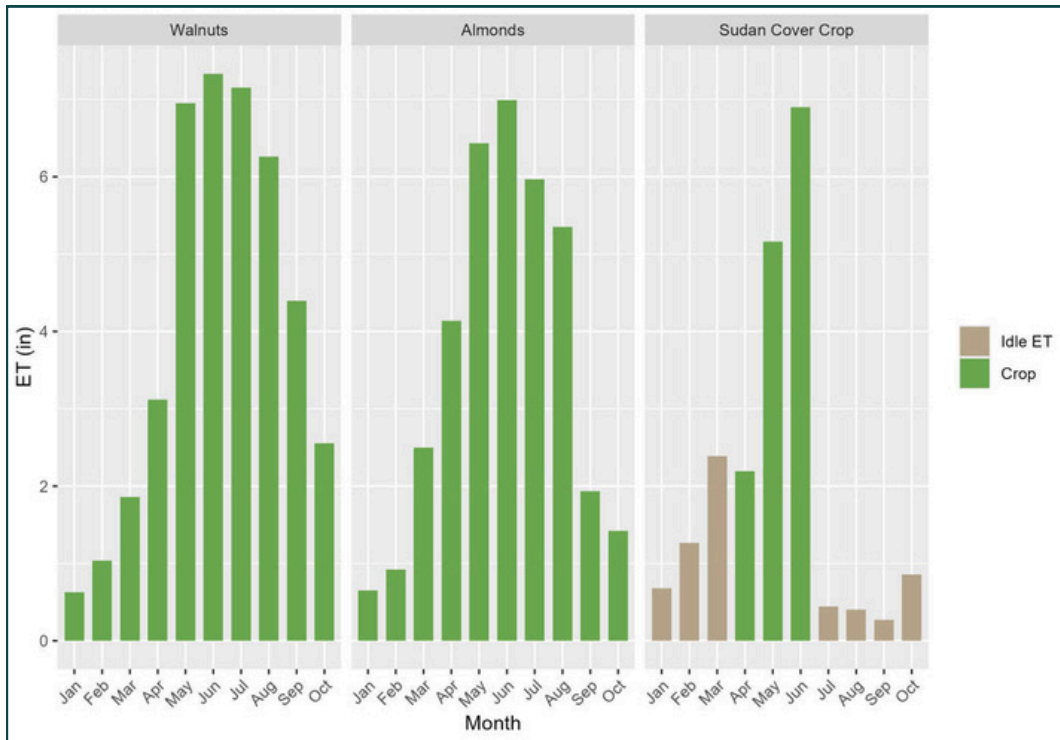


Figure 1. Mean ET by Crop Type January - October



Extended Orchard Replacement (EOR) Case Study

Spring/Summer Sudan/Sorghum Cover Crop



CONSIDERATIONS

Potential benefits from sudan grass include:

- Fast growing producing high biomass in 2-3 months
- Suppresses weeds
- Improves soil structure and water infiltration
- Organic matter addition, increasing carbon and soil fertility (high C:N ratio, so decomposes slowly)
- Nematode reduction, but can also harbor nematodes
- Can be harvested as forage (makes high quality forage or silage) with multiple cuttings or worked in to use as green manure; harvested with grain harvesting equipment, or flail chopped
- Some varieties harbor beneficial insects such as lady beetles, and lacewings
- Scavenges water from deep soil layers
- May be used in mixes
- Tolerates very high pH (8.0 to 9.0) and salinity
- Can grow with very little precipitation

FINANCIAL ANALYSIS

The financial analysis considers an almond orchard that is removed and the land is idled for a period of 1, 2, or 3 years prior to replanting to almonds. During the idle period, under this scenario, a grassy cover crop, such as sudan grass, is planted in the spring and removed at the end of the growing season. This creates water savings and provides some soil and other agronomic benefits.

An analysis was developed to compare the net income (revenue minus costs) to the grower when immediately replanting versus delaying replanting by 1, 2, or 3 years.

- **Revenues.** The almond orchard is removed in Year 0. If it is immediately replanted to almonds the next season (Year 1) it will produce the first crop in year 3 (3rd leaf). It would generate positive net cash flow in Year 6. Delaying replanting by 1 year means the block produces its first crop in Year 4 and generates positive net cash flow in Year 7. Similar logic applies to delaying replanting by 2 or 3 years. For delayed replanting, a spring sudan grass cover crop is planted, however not harvested. Although there is no revenue generated from the sale of this cover crop, there is benefit in the form of reduced cost for soil amendment at \$15 per acre in the first two years of orchard planting.
- **Costs.** The almond orchard is removed in Year 0 at a cost of approximately \$2,800 per acre for tree removal, grinding trees, composting, ripping for root removal, disc, and roll. Replanting costs include trees, spraying, and field establishment. These costs are incurred in Year 1 if the block is immediately replanted, and are incurred in Years 2, 3, or 4 if replanting is delayed. For delayed replanting, spring sudan grass is planted at cost of \$122 per acre, excluding overhead.



Extended Orchard Replacement (EOR) Case Study

Spring/Summer Sudan/Sorghum Cover Crop



FINANCIAL ANALYSIS

- Other considerations.** Delaying replanting may provide additional soil and pest management benefits. Depending on the duration of the replanting period some growers may be able to avoid fumigation for nematode management. Other soil and crop productivity benefits may provide cost savings through reduced amendments or increased productivity.
- Water savings.** Almond orchards average evapotranspiration (ET) of 3.03 acre-feet per acre over a 25-year orchard. The cover crop ET is assumed to be 1.43 acre-feet per acre. ET savings are 1.60, 3.20, and 4.80 acre-feet per acre in the 1-year, 2-year, and 3-year replanting delay scenarios. The corresponding cost of water savings are \$487, \$478, and \$469 per acre-foot of water saved, respectively.

The analysis illustrates representative costs, yields, and returns. Actual costs and returns will vary by farming operation. A grower, or a grower that is also a handler, will have different access to cash and borrowing that may affect operations and outcomes. Almond prices fluctuate based on market conditions and would affect the values in this analysis. The analysis applies to representative almond yields and a price of \$2.25/lb. for almonds.¹

An enterprise farm budget was developed for this scenario that includes all costs and revenues: removal and replanting, cash costs, capital costs, overhead, and crop revenue from the orchard. Table 1 summarizes the expenses (excluding all overhead) that would be incurred under each option. By delaying replanting the grower defers the outlay for stand establishment and instead incurs lower costs to plant the spring sudan grass cover crop. Delaying replanting delays the initial bearing years and break-even net cash flow.

Table 1. Summary of Selected Almond Orchard Replanting Costs for the Spring Sudan Grass Scenario

Metric	No Delay \$/ac	1-Year Delay \$/ac	2-Year Delay \$/ac	3-Year Delay \$/ac
Year 0	Removal (\$2,800)	Removal (\$2,800)	Removal (\$2,800)	Removal (\$2,800)
Year 1	Replant (\$6,300)	Spring Grass (\$122)	Spring Grass (\$122)	Spring Grass (\$122)
Year 2	1st leaf	Replant (\$6,300)	Spring Grass (\$122)	Spring Grass (\$122)
Year 3	2nd leaf	1st leaf	Replant (\$6,300)	Spring Grass (\$122)
Year 4	3rd leaf	2nd leaf	1st leaf	Replant (\$6,300)
Orchard Cash Flow Break Even	Year 6	Year 7	Year 8	Year 9

¹Additional analysis, discussion, and sensitivity scenarios are available in the full Vina Subbasin Extend Orchard Replacement Program Report.



Extended Orchard Replacement (EOR) Case Study

Spring/Summer Sudan/Sorghum Cover Crop



FINANCIAL ANALYSIS

The financial analysis shows the additional cost to delay replanting. The timing of income (revenues) and costs to the grower changes. A financial analysis was developed to calculate the break-even payment that would be required to make the grower indifferent between immediately replanting, or delaying replanting by a period of 1, 2, or 3 years. A program offering incentive payments for delayed replanting would offer a payment equal to or greater than this amount.

Almond Incentive Payment (per acre) Spring Sudan Grass

1-year	\$758
2-year	\$1,487
3-year	\$2,187

Incentive Payment Sensitivity (per acre) Spring Sudan Grass

Low Almond Incentive Payment	\$485/ac
High Almond Incentive Payment	\$1,214/ac

The results presented are sensitive to key cost and market factors applied in this analysis, particularly commodity price and net returns from alternative uses/crops during the replanting period. To better understand how these factors affect the incentives across different scenarios, a sensitivity analysis incorporates alternative prices, replanting costs, and yield into the payment calculations. These are presented as a range of low and high for one-year payments.

The cover crop may provide soil benefits, which would potentially boost orchard yield. Anecdotal reports from growers report more vigorous orchard growth and better production when delaying replanting. An additional financial analysis was developed to calculate the break-even yield/production increase for the grower where the greater yields for the future orchard offset the initial cost of delaying replanting. Figure 1 summarizes the results from this analysis.

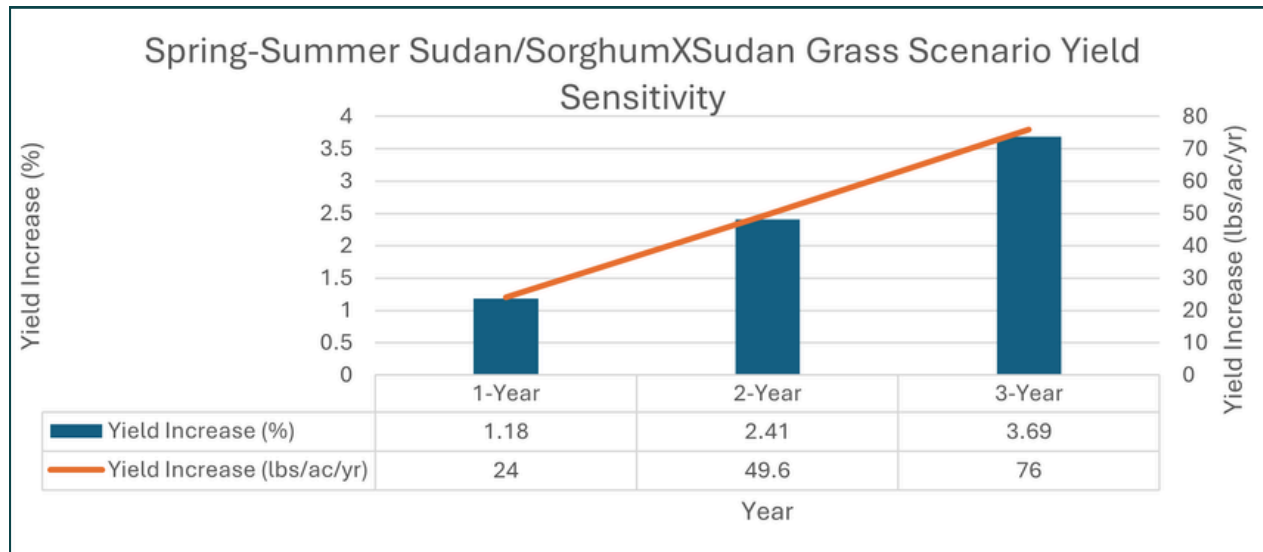


Figure 2. Yield Impact Sensitivity Analysis for the Spring Sudan Grass Scenario



Extended Orchard Replacement (EOR) Case Study

Spring/Summer Sudan/Sorghum Cover Crop



FINANCIAL ANALYSIS

For the spring sudan grass, yield for a one-year delay would need to be 1.18% higher throughout the 25-year life of the orchard to offset the upfront expense of delayed replanting. This corresponds to a 24 lbs per acre yield increase. This yield increase rises with the number of years delayed due to the higher overhead expenses and orchard production delay.

Table 2 presents a financial summary including revenue, cost, and yield impacts. Assuming yield is unchanged, there is a cost to delay replanting, and additional fallow year costs, which are captured by the declining value measure. The financial model then calculates the Breakeven Yield Factor, which is the yield increase necessary for value to be equal between the No delay scenario, and the corresponding number of years of delay.

Table 2. Breakeven Analysis for the Spring Sudan Grass Scenario

Metric	No Delay \$/ac	1-Year Delay \$/ac	2-Year Delay \$/ac	3-Year Delay \$/ac
Value at Yield Factor = 1.00	\$4,818	\$4,287	\$3,776	\$3,285
Annual Costs				
Cover crop planting cost	\$0	\$122	\$122	\$122
Basic fallow year costs	\$0	\$364	\$364	\$364
Cover crop revenue	\$0	\$0	\$0	\$0
Cover crop benefit	\$0	\$30	\$30	\$30
Net Revenue	\$0	(\$456)	(\$942)	(\$1,428)
One-Time Costs				
Removal	\$2,800	\$2,800	\$2,800	\$2,800
Replant	\$6,300	\$6,300	\$6,300	\$6,300
Breakeven Yield Factor	1	1.01183	1.02413	1.03693



ATTACHMENT G

Case Study – Processing Tomatoes

Extended Orchard Replacement (EOR) Case Study Processing Tomatoes



DEFINITION

Here an EOR summer cash crop of processing tomatoes includes the following assumptions:

- Spring or early summer planting
- Multiple-year lease with tenant grower
- Subsurface or surface drip irrigation

WATER USE

Processing tomato crops consumed 21.8 inches of water during their growing season in 2025. For months when the land was idle, another 8.6 inches of water was consumed, for a total of 30.4 inches of consumed water for this land use January to October 2025.

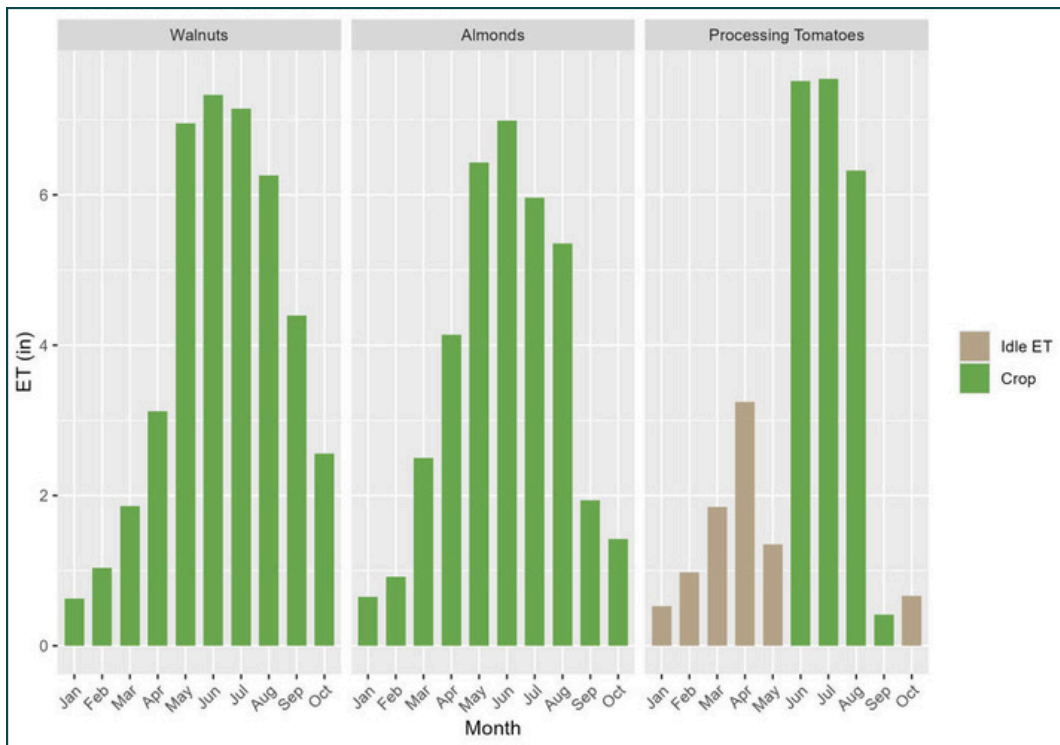


Figure 1. Mean ET by Crop Type January - October



Extended Orchard Replacement (EOR) Case Study Processing Tomatoes



CONSIDERATIONS

- Must find somebody to lease
- Lease term
- Legacy effects of fertilizer or pesticides

FINANCIAL ANALYSIS

The financial analysis considers an almond orchard that is removed and the land is idled for a period of 1, 2, or 3 years prior to replanting to almonds. During the idle period, under this scenario, a contract is entered into with a tenant to plant processing tomatoes as a cash crop, planted in spring and harvested in late summer or fall (depending on timing of planting). A crop rent contract is applied with the landowner receiving a percentage of gross revenues and is responsible for overhead costs and water supply. This creates water savings and provides a harvestable crop.

An analysis was developed to compare the net income (revenue minus costs) to the grower when immediately replanting versus delaying replanting by 1, 2, or 3 years.

- **Revenues.** The almond orchard is removed in Year 0. If it is immediately replanted to almonds the next season (Year 1) it will produce the first crop in Year 3 (3rd leaf). It would generate positive net cash flow in Year 6. Delaying replanting by 1 year means the block produces its first crop in Year 4 and generates positive net cash flow in Year 7. Similar logic applies to delaying replanting by 2 or 3 years. For delayed planting, a tomato crop is planted and harvested generating \$826 per acre in revenue.
- **Costs.** The almond orchard is removed in Year 0 at a cost of approximately \$2,800 per acre for tree removal, grinding trees, composting, ripping for root removal, disc, and roll. Replanting costs include trees, spraying, and field establishment. These costs are incurred in Year 1 if the block is immediately replanted, and are incurred in Years 2, 3, or 4 if replanting is delayed. For delayed replanting, the tomato crop is planted at cost of \$273 per acre, excluding overhead.
- **Other considerations.** Delaying replanting may provide additional soil and pest management benefits. Other soil and crop productivity benefits may provide cost savings through reduced amendments or increased productivity.
- **Water savings.** Almond orchards average evapotranspiration (ET) of 3.03 acre-feet per acre over a 25-year orchard. The processing tomato ET is assumed to be 2.53 acre-feet per acre. ET savings are 0.50, 1.0, and 1.50 acre-feet per acre in the 1-year, 2-year, and 3-year replanting delay scenarios. The corresponding cost of water savings are \$299, \$294, and \$288 per acre-foot of water saved, respectively.



Extended Orchard Replacement (EOR) Case Study Processing Tomatoes



FINANCIAL ANALYSIS

The analysis illustrates representative costs, yields, and returns. Actual costs and returns will vary by farming operation. A grower, or a grower that is also a handler, will have different access to cash and borrowing that may affect operations and outcomes. Almond prices fluctuate based on market conditions and would affect the values in this analysis. The analysis applies to representative almond yields and a price of \$2.25/lb. for almonds.¹

An enterprise farm budget was developed for this scenario that includes all costs and revenues: removal and replanting, cash costs, capital costs, overhead, and crop revenue from the orchard or processing tomatoes. Table 1 summarizes the costs (excluding all overhead) for expenses that would be incurred under each option. By delaying replanting the grower defers the outlay for stand establishment and instead incurs lower costs to plant the tomato crop. The tomato harvest offset some of these costs. Delaying replanting delays the initial bearing years and break-even net cash flow.

Table 1. Summary of Selected Almond Orchard Replanting Costs for the Processing Tomatoes Scenario

Metric	No Delay \$/ac	1-Year Delay \$/ac	2-Year Delay \$/ac	3-Year Delay \$/ac
Year 0	Removal (\$2,800)	Removal (\$2,800)	Removal (\$2,800)	Removal (\$2,800)
Year 1	Replant (\$6,300)	Tomato (\$273)	Tomato (\$273)	Tomato (\$273)
Year 2	1st leaf	Replant (\$6,300)	Tomato (\$273)	Tomato (\$273)
Year 3	2nd leaf	1st leaf	Replant (\$6,300)	Tomato (\$273)
Year 4	3rd leaf	2nd leaf	1st leaf	Replant (\$6,300)
Orchard Cash Flow Break Even	Year 6	Year 7	Year 8	Year 9

The financial analysis shows the additional cost to delay replanting. The timing of income (revenues) and costs to the grower changes. A financial analysis was developed to calculate the break-even payment that would be required to make the grower indifferent between immediately replanting, or delaying replanting by a period of 1, 2, or 3 years. A program offering incentive payments for delayed replanting would offer a payment equal to or greater than this amount.

Almond Incentive Payment (per acre) Processing Tomatoes

1-year	\$107
2-year	\$210
3-year	\$309

¹Additional analysis, discussion, and sensitivity scenarios are available in the full Vina Subbasin Extend Orchard Replacement Program Report.



Extended Orchard Replacement (EOR) Case Study Processing Tomatoes



FINANCIAL ANALYSIS

Incentive Payment Sensitivity (per acre) Processing Tomatoes

Low Almond Incentive Payment
(\$166)/ac

High Almond Incentive Payment
\$563/ac

The results presented are sensitive to key cost and market factors applied in this analysis, particularly commodity price and net returns from alternative uses/crops during the replanting period. To better understand how these factors affect the incentives across different scenarios, a sensitivity analysis incorporates alternative prices, replanting costs, and yield into the payment calculations. These are presented as a range of low and high for one-year payments.

The payment range for tomatoes is an excellent illustration of the impact of these factors. When relatively low almond prices are applied, the analysis indicates that farming processing tomatoes during the idle year can be more profitable than delaying replanting without production, thereby substantially reducing (eliminating) the required incentive payment. On the other hand, high almond prices substantially increase the minimum incentive required to encourage a grower to switch to tomatoes for a fallow year instead of immediately replanting.

Delayed replanting may provide soil benefits, which would potentially boost orchard yield. Anecdotal reports from growers report more vigorous orchard growth and better production when delaying replanting. An additional financial analysis was developed to calculate the break-even yield/production increase for the grower where the greater yields for the future orchard offset the initial cost of delaying replanting. Figure 1 summarizes the results from this analysis.

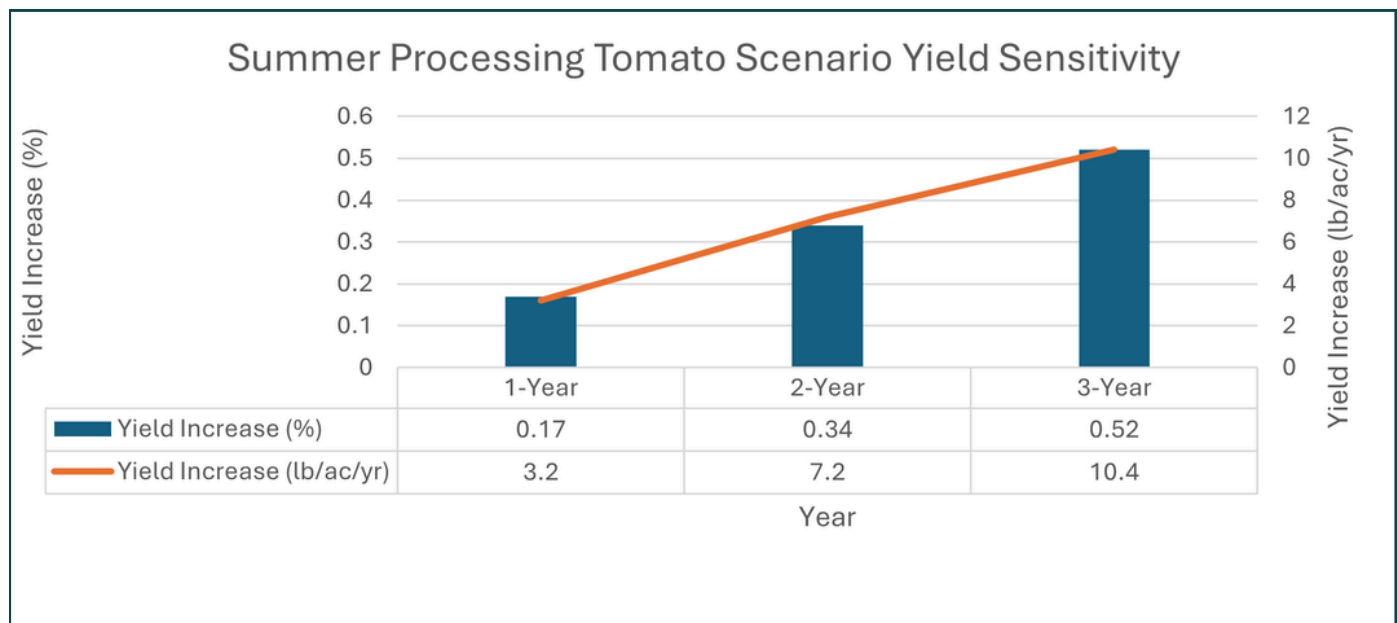


Figure 2. Yield Impact Sensitivity Analysis for the Processing Tomatoes Scenario



Extended Orchard Replacement (EOR) Case Study Processing Tomatoes



FINANCIAL ANALYSIS

For the summer processing tomato scenario, yield for a one-year delay would need to be 0.17% higher throughout the 25-year life of the orchard to offset the upfront expense of delayed replanting. This corresponds to a 3.2 lbs per acre yield increase. This yield increase rises with the number of years delayed due to the higher overhead expenses and orchard production delay.

Table 2 presents a financial summary including revenue, cost, and yield impacts. Assuming yield is unchanged, there is a cost to delay replanting, and additional fallow year costs, which are captured by the declining value measure. The financial model then calculates the Breakeven Yield Factor, which is the yield increase necessary for value to be equal between the No delay scenario, and the corresponding number of years of delay.

Table 2. Breakeven Analysis for the Processing Tomatoes Scenario

Metric	No Delay \$/ac	1-Year Delay \$/ac	2-Year Delay \$/ac	3-Year Delay \$/ac
Value at Yield Factor = 1.00	\$4,864	\$4,073	\$3,313	\$2,582
Annual Costs				
Cover crop planting cost	\$0	\$273	\$273	\$273
Basic fallow year costs	\$0	\$364	\$364	\$364
Cover crop revenue	\$0	\$826	\$826	\$826
Net Revenue	\$0	\$189	\$378	\$567
One-Time Costs				
Removal	\$2,800	\$2,800	\$2,800	\$2,800
Replant	\$6,300	\$6,300	\$6,300	\$6,300
Breakeven Yield Factor	1	1.01234	1.02517	1.03582



ATTACHMENT H

Case Study – Dry Beans

Extended Orchard Replacement (EOR) Case Study Dry Beans



DEFINITION

Here an EOR summer cash crop of dry beans includes the following assumptions:

- Dry beans such as pinto, lima, kidney, canary
- Beans grown under crop rent contract
- Planted from May to early June
- Furrow irrigated

WATER USE

Summer dry bean crops consumed 16.3 inches of water during their growing season in 2025. For months when the land was idle, another 8.6 inches of water was consumed, for a total of 24.9 inches of consumed water for this land use January to October 2025.

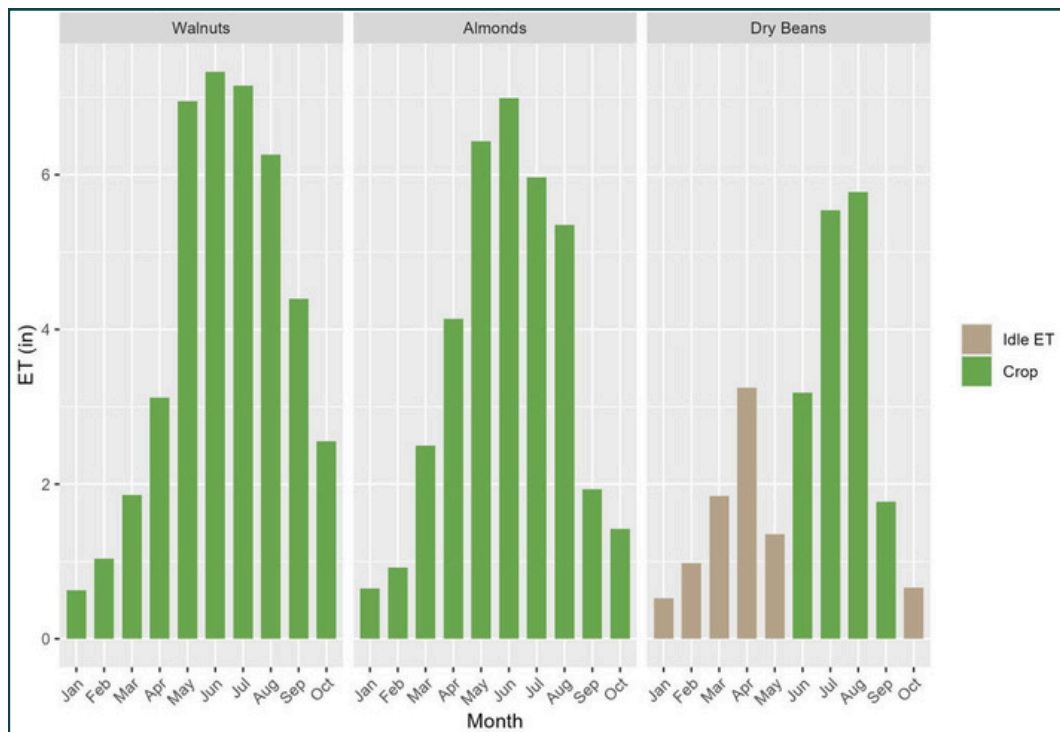


Figure 1. Mean ET by Crop Type January - October



Extended Orchard Replacement (EOR) Case Study Dry Beans



CONSIDERATIONS

- Have to find somebody to lease
- Fix atmospheric nitrogen and may reduce nitrogen fertilizer application rates
- Break disease cycle associated with monocultures

FINANCIAL ANALYSIS

The financial analysis considers an almond orchard that is removed and the land is idled for a period of 1, 2, or 3 years prior to replanting to almonds. During the idle period, under this scenario, a contract is entered into with a tenant to plant dry beans (pinto, kidney, lima, etc.) in the spring and harvest the crop in the fall. A crop rent contract is applied, with the landowner receiving a percentage of gross revenues and responsible for overhead costs and water supply. This creates water savings, provides a harvestable crop, and provides some soil and other agronomic benefits.

An analysis was developed to compare the net income (revenue minus costs) to the grower when immediately replanting versus delaying replanting by 1, 2, or 3 years.

- **Revenues.** The almond orchard is removed in Year 0. If it is immediately replanted to almonds the next season (Year 1), it will produce the first crop in Year 3 (3rd leaf). It would generate positive net cash flow in Year 6. Delaying replanting by 1 year means the block produces its first crop in Year 4 and generates positive net cash flow in Year 7. Similar logic applies to delaying replanting by 2 or 3 years. For delayed planting, a dry bean crop is planted and harvested, generating \$169 per acre in revenue.
- **Costs.** The almond orchard is removed in Year 0 at a cost of approximately \$2,800 per acre for tree removal, grinding trees, composting, ripping for root removal, disc, and roll. Replanting costs include trees, spraying, and field establishment. These costs are incurred in Year 1 if the block is immediately replanted, and are incurred in Years 2, 3, or 4 if replanting is delayed. For delayed replanting, the dry bean crop is planted at cost of \$129 per acre, excluding overhead.
- **Other considerations.** Delaying replanting may provide additional soil and pest management benefits. Other soil and crop productivity benefits may provide cost savings through reduced amendments or increased productivity.
- **Water savings.** Almond orchards average evapotranspiration (ET) of 3.03 acre-feet per acre over a 25-year orchard. The dry beans ET is assumed to be 2.08 acre-feet per acre. ET savings are 0.95, 1.90, and 2.85 acre-feet per acre in the 1-year, 2-year, and 3-year replanting delay scenarios. The corresponding value of water savings are \$734, \$720, and \$707 per acre-foot of water saved, respectively.



Extended Orchard Replacement (EOR) Case Study Dry Beans



FINANCIAL ANALYSIS

The analysis illustrates representative costs, yields, and returns. Actual costs and returns will vary by farming operation. A grower, or a grower that is also a handler, will have different access to cash and borrowing that may affect operations and outcomes. Almond prices fluctuate based on market conditions and would affect the values in this analysis. The analysis applies to representative almond yields and a price of \$2.25/lb. for almonds.¹

An enterprise farm budget was developed for this scenario that includes all costs and revenues: removal and replanting, cash costs, capital costs, overhead, and crop revenue from the orchard or dry beans. Table 1 summarizes the costs (excluding all overhead) for expenses that would be incurred under each option. By delaying replanting the grower defers the outlay for stand establishment and instead incurs lower costs to plant the dry bean crop. The dry bean harvest offsets some of these costs. Delaying replanting delays the initial bearing years and break-even net cash flow.

Table 1. Summary of Selected Almond Orchard Replanting Costs for the Dry Beans Scenario

Metric	No Delay \$/ac	1-Year Delay \$/ac	2-Year Delay \$/ac	3-Year Delay \$/ac
Year 0	Removal (\$2,800)	Removal (\$2,800)	Removal (\$2,800)	Removal (\$2,800)
Year 1	Replant (\$6,300)	Dry beans (\$129)	Dry beans (\$129)	Dry beans (\$129)
Year 2	1st leaf	Replant (\$6,300)	Dry beans (\$129)	Dry beans (\$129)
Year 3	2nd leaf	1st leaf	Replant (\$6,300)	Dry beans (\$129)
Year 4	3rd leaf	2nd leaf	1st leaf	Replant (\$6,300)
Orchard Cash Flow Break Even	Year 6	Year 7	Year 8	Year 9

The financial analysis shows the additional cost to delay replanting. The timing of income (revenues) and costs to the grower changes. A financial analysis was developed to calculate the break-even payment that would be required to make the grower indifferent between immediately replanting, or delaying replanting by a period of 1, 2, or 3 years. A program offering incentive payments for delayed replanting would offer a payment equal to or greater than this amount.

Almond Incentive Payment (per acre) Dry Beans

1-year	\$600
2-year	\$1,178
3-year	\$1,733

¹Additional analysis, discussion, and sensitivity scenarios are available in the full Vina Subbasin Extend Orchard Replacement Program Report.



Extended Orchard Replacement (EOR) Case Study Dry Beans



FINANCIAL ANALYSIS

Incentive Payment Sensitivity (per acre) Dry Beans

Low Almond Incentive Payment

\$327/ac

High Almond Incentive Payment

\$1,056/ac

The results presented are sensitive to key cost and market factors applied in this analysis, particularly commodity price and net returns from alternative uses/crops during the replanting period. To better understand how these factors affect the incentives across different scenarios, a sensitivity analysis incorporates alternative prices, replanting costs, and yield into the payment calculations. These are presented as a range of low and high for one-year payments.

The bean crop may provide soil benefits, which would potentially boost orchard yield. Anecdotal reports from growers report more vigorous orchard growth and better production when delaying replanting. An additional financial analysis was developed to calculate the break-even yield/production increase for the grower where the greater yields for the future orchard offset the initial cost of delaying replanting. Figure 1 summarizes the results from this analysis.

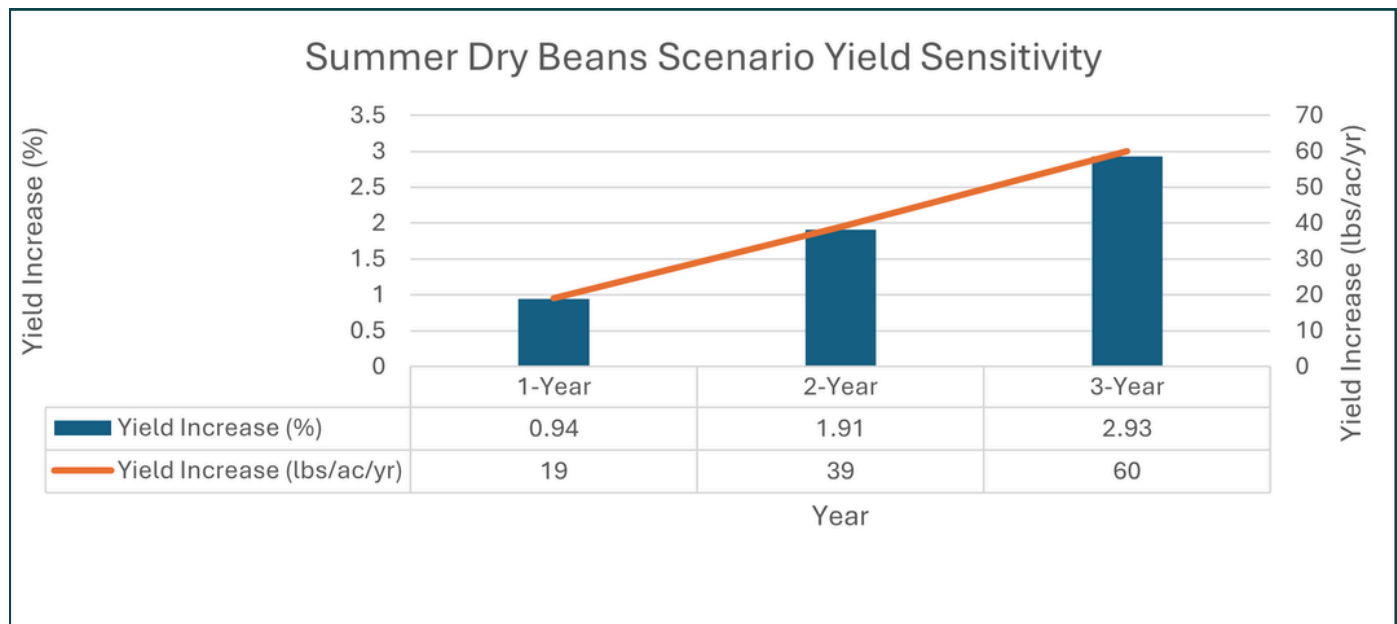


Figure 2. Yield Impact Sensitivity Analysis for the Dry Beans Scenario



Extended Orchard Replacement (EOR) Case Study Dry Beans



FINANCIAL ANALYSIS

For the dry bean crop, yield for a one-year delay would need to be 0.94% higher throughout the 25-year life of the orchard to offset the upfront expense of delayed replanting. This corresponds to a ~18 lbs per acre yield increase. This yield increase rises with the number of years delayed replanting due to the higher overhead expenses and orchard production delay.

Table 2 presents a financial summary including revenue, cost, and yield impacts. Assuming yield is unchanged, there is a cost to delay replanting, and additional fallow year costs, which are captured by the declining value measure. The financial model then calculates the Breakeven Yield Factor, which is the yield increase necessary for value to be equal between the No delay scenario, and the corresponding number of years of delay.

Table 2. Breakeven Analysis for the Dry Beans Scenario

Metric	No Delay \$/ac	1-Year Delay \$/ac	2-Year Delay \$/ac	3-Year Delay \$/ac
Value at Yield Factor = 1.00	\$4,818	\$4,218	\$3,641	\$3,085
Annual Costs				
Cover crop planting cost	\$0	\$129	\$129	\$129
Basic fallow year costs	\$0	\$364	\$364	\$364
Cover crop revenue	\$0	\$169	\$169	\$169
Net Revenue	\$0	(\$324)	(\$628)	(\$972)
One-Time Costs				
Removal	\$2,800	\$2,800	\$2,800	\$2,800
Replant	\$6,300	\$6,300	\$6,300	\$6,300
Breakeven Yield Factor	1	1.00937	1.01912	1.02926

