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A METHOD TO ESTIMATE NET LOSS FROM LOSING A PECAN TREE[1]

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Abstract. **Each year Florida producers lose many productive and developing pecan trees due to government condemnation, or some type of physical damage. If a damaged pecan tree that is lost from production is replaced, the income foregone includes both that income lost in the current crop and the expected future income generated from the tree if the tree had not been lost from production.**

A method for estimating net loss from losing a pecan tree with examples is presented. Since the loss of future income is considered, discounting is used to calculate the present value of the loss. Growers, accountants, and appraisers can utilize this method as a guide to assist in estimating net total loss from losing a pecan tree using individual data from specific trees.

A problem of increasing importance to pecan producers is one of estimating the monetary value from losing pecan trees. This is particularly true for valuations of right-of-way easements, highways, and other projects which involve condemnation of property. Florida pecan producers who lose productive and/or developing pecan trees due to condemnation, disease, lightning, water damage and other accidents often inquire how their financial loss from losing a pecan tree may be determined.

A method for estimating net loss has been developed by Muraro, et. al. (5) for use in a citrus operation. This method is applicable for pecan orchards with minor changes. The productive life of a pecan tree is much longer than an orange tree. The number of years until peak production is also longer for pecan trees. The age of the orchard is a critical factor that is often overlooked in most orchard valuations as the age will determine the level of future productivity as well as current production levels.

Since production practices vary among growers, a standard set of guidelines or methods to determine additional cost and financial loss is difficult to apply. However, under the assumption that the tree is replanted with a reset, the loss in future income may be partitioned into two parts; the additional care given a young tree after replanting, and the difference in yield between the lost tree and the newly replanted tree.

The following discussion and examples present only one method for estimating additional cost and financial loss from losing and replacing a pecan tree. Other methods and ideas should be considered and utilized where applicable.

The method presented is not intended to provide recommended details for determining tax deductible income loss for trees destroyed or valuing trees for depreciation purposes for Federal Income Tax reporting. Internal Revenue Service (IRS) auditors should be consulted for assistance in determining casualty losses.

Note that the additional cost and financial loss figures attached to the pecan trees are not the current value of the tree. Current value for appraisal purposes is based upon annual net return to the tree and land area. The cost and financial loss figures herein represent replacement cost and income loss over a time span of years.

Estimating Additional Cost and Financial Loss

The first step in determining the additional cost and financial loss is to visually inspect the grove and record the number of trees lost from damage or to be lost by condemnation. Next, determine the current level of production and estimate the future crop production of the lost trees. Depending on tree spacings, environmental conditions, management, and cultural practices, production from a pecan orchard may be zero to highly productive. Yields in Florida usually range from 300 to 2000 pounds per acre from mature trees (1, 2). In this analysis a pecan production average of 1200 pounds per acre is assumed under conditions of good management, adapted varieties, and suitable soil and moisture. This figure assumes that twelve trees of improved varieties per acre are each producing 100 pounds of nuts at full productivity. Table 1 shows a schedule of expected levels of pecan orchard production for Florida orchards given the above mentioned assumptions.

Table 1. Schedule of expected levels of pecan orchard production in Florida.

Years	Percent of peak production	Annual production expected (lbs. per acre)
	(Based on peak annual production of 1,200# per acre)	
1-7	0	0
8-13	30	360
14-20	65	780
21-30	90	1080
31-40	100	1200
41-50	100	1200
51-60	100	1200
61-70	90	1080
71-80	80	960
81-90	65	780
91-100	60	720

Source: [1, 2, 6]

The next two steps are to determine the current cost of tree replacement and the value of the current crop lost. Orchard records are a good source of information for these two steps. Pecan budgets have been developed by Hewitt (4), and for illustrative purposes costs from those budgets will be used. The current per tree replacement cost is assumed to be $15 for the first year, $10 for years 2 through 7, and $34 for year 8 through the productive life of the tree. To determine the value of the current crop lost, a price of $ .80/lb. is used. Florida producers are expected to realize this price accompanied by high production levels per tree.

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Discounting

The next step is to discount additional cost and financial loss to present day values. A discount rate is a measure of income lost from receiving income later than at the normally expected time. Thus, when a pecan tree is lost and replaced, income for annual yields normally expected from the tree if the tree had lived must be discounted to a present value.

The appropriate discount rate is difficult to determine. There are several methods available to derive a discount rate and all may yield a different rate. Published interest rates for various investment items are often used for the discount rate. Money market certificates are currently yielding 12.5% interest. Short term certificate of deposits are yielding 11.75% interest. Corporate bond rates are approximately 12% at the present time. Thus, 12% is a fair discount rate to use under current financial conditions. Present value factors, given a range of discount rates, are shown in Table 2. For example, if the capitalization (discount) rate used is 12%, $1.00 of expected income fifteen years from now has a present value of $0.18. For illustrative purposes, a 12% capitalization rate, as derived above, will be used.

Table 2. Present value factors of $1.00, given selected discount rates.

Year	8.0	9.0	10.0	11.0	12.0	13.0	14.0	15.0
1	.926	.917	.909	.901	.893	.885	.877	.870
2	.857	.842	.826	.812	.797	.783	.769	.756
3	.794	.772	.751	.731	.712	.693	.675	.658
4	.735	.708	.683	.659	.636	.613	.592	.572
5	.681	.650	.621	.593	.567	.543	.519	.497
6	.630	.596	.564	.535	.507	.480	.456	.432
7	.583	.547	.513	.482	.452	.425	.400	.376
8	.540	.502	.467	.434	.404	.376	.351	.327
9	.500	.460	.424	.391	.361	.333	.308	.284
10	.463	.422	.386	.352	.322	.295	.270	.247
11	.429	.388	.350	.317	.287	.261	.237	.215
12	.397	.356	.319	.286	.257	.231	.208	.187
13	.368	.326	.290	.256	.229	.204	.182	.163
14	.340	.299	.263	.232	.205	.181	.160	.141
15	.315	.275	.239	.209	.183	.160	.140	.123
16	.292	.252	.218	.188	.163	.141	.123	.107
17	.270	.231	.198	.170	.146	.125	.108	.093
18	.250	.212	.180	.153	.130	.111	.095	.081
19	.232	.194	.164	.138	.116	.098	.083	.070
20	.215	.178	.149	.124	.104	.087	.073	.061
21	.199	.164	.135	.112	.093	.077	.064	.053
22	.184	.150	.123	.101	.083	.068	.056	.046
23	.170	.138	.112	.091	.074	.060	.049	.040
24	.158	.126	.102	.082	.066	.053	.043	.035
25	.146	.116	.092	.074	.059	.047	.038	.030
26	.135	.106	.084	.066	.053	.042	.033	.026
27	.125	.098	.076	.060	.047	.037	.029	.023
28	.116	.090	.069	.054	.042	.033	.026	.020
29	.107	.082	.063	.048	.037	.029	.022	.017
30	.099	.075	.057	.044	.033	.026	.020	.015
31	.092	.069	.052	.039	.030	.023	.017	.013
32	.085	.063	.047	.035	.027	.020	.015	.011
33	.079	.058	.043	.032	.024	.018	.013	.010
34	.073	.053	.039	.029	.021	.016	.012	.009
35	.068	.049	.036	.026	.019	.014	.010	.008

Method

In this analysis, the annual expected gross income and grove care costs of the lost tree are multiplied by the present value factors, using the 12% rate, yielding discounted income and discounted costs. The difference between these two values gives the annual discounted net return of the lost tree. The same procedure is used to discount income and costs for the replanted tree. The annual discounted returns are summed to derive the discounted net return of the lost tree and the discounted new cost of the replanted tree.

The number of years over which the summation is performed is the number of years required for the replanted tree to reach maturity. At this time, the pecan tree lost and the replanted tree will yield equally. Tree age at maturity will vary among pecan varieties. On the average, peak production will begin at approximately thirty-one years of age as shown in Table 1. For purposes of analysis, thirty-one year old pecan trees are classified as mature.

If maturity is assumed to be later than thirty-one years of age, the procedure in Tables 3 and 4 would be carried out to the appropriate age. However, when using the 12% discount rate the factor is low after thirty-one years and only a few more dollars would be added to the total. Discounting the sum of the additional cost and the loss income and then summing these figures gives the net present value of total financial loss to the producer.

Examples

Assume a thirty-five year old pecan tree with a current crop expectation of 100 pounds of nuts is killed by disease. The current price of pecans is estimated at $ .80 per pound. The estimated future price of pecans is expected to average $ .80 per pound.

The net present value of total loss to the owner is shown in Table 3. Columns 1 through 6 represent the net foregone income while columns 7 through 11 represent net additional cost. The computed production, income and costs expected, and the resulting present value if the tree had lived, are shown in columns 1 through 6. The annual present values over a thirty-one year future are summed. In column 2 expected income is $80 until year 27 after replanting when expected income declines to $72 per tree. At that time the tree would have been sixty-one years of age and production would decline to 72 pounds of nuts per tree (Table 1). The total present value of orchard care costs, $275.00 (column 5) is subtracted from the total present value of expected income $645.52 (column 3) to derive a discounted net return of the tree lost $370.52 (column 6).

The computed production (Table 1), income and costs expected, and the resulting present value when a pecan tree is reset is shown in columns 7 through 11. These values are expected in the future, thus are discounted annually, and then summed to derive a discounted net cost of $26.16 for the reset tree (column 11).

A net present value of $396.68 (column 12) is obtained by adding the sum of the discounted net return if the tree had lived to the discounted net costs for the reset tree.

The same analysis may be used for fifteen year old trees that are lost to condemnation. The producer who loses pecan trees due to condemnation must estimate the net present value of total loss for thirty-one years. If the producer had to replant trees on other property, it would take thirty-one years to obtain full maturity. Of course, his expected income would vary from that shown in Table 3 because a fifteen year old tree is sixteen years from productive maturity.

The net present value of total loss, the cost of caring for the tree if there had not been a condemnation, the additional cost of the reset tree and the income foregone as the reset tree reaches maturity are shown in Table 4. The $233.98 estimated discounted net return from the lost tree (column 6) is added to the $26.16 discounted net return of the reset tree (column 11) to give the $260.14 (column 12) net present value of total loss from losing a fifteen year old pecan tree through condemnation and replanting the

Table 3. Estimated net present value of total loss from losing a 35-year old pecan tree.

	Column											
	1	2	3	4	5	6	7	8	9	10	11	12
Years after re-planting	Present value factor @ 12% discount rate	Expected income if tree had lived: average #/tree @ 80¢/lb.	Present value of expected income (1 x 2)	Grove care cost if tree had lived	Present value of grove care cost (1 x 4)	Discounted net return of tree lost (3-5)	Expected grove care cost of reset tree	Present value of grove care cost (1 x 7)	Expected income from reset tree	Present value of expected income (1 x 9)	Discounted net cost of reset tree (8 − 10)	Net present value of total loss from tree lost (6 + 11)
1	.893	$80	$71.44	$34	$30.36		$15	$13.40	$ 0.00	$ 0.00		
2	.797	80	63.76	34	27.10		10	7.97	0.00	0.00		
3	.712	80	56.96	34	24.21		10	7.12	0.00	0.00		
4	.636	80	50.88	34	21.62		10	6.36	0.00	0.00		
5	.567	80	45.36	34	19.28		10	5.67	0.00	0.00		
6	.507	80	40.56	34	17.24		10	5.07	0.00	0.00		
7	.452	80	36.16	34	15.37		10	4.52	0.00	0.00		
8	.404	80	32.32	34	13.74		34	13.74	24.00	9.70		
9	.361	80	28.88	34	12.27		34	12.27	24.00	8.66		
10	.322	80	25.76	34	10.95		34	10.95	24.00	7.73		
11	.287	80	22.96	34	9.76		34	9.76	24.00	6.89		
12	.257	80	20.56	34	8.74		34	8.74	24.00	6.17		
13	.229	80	18.32	34	7.79		34	7.79	24.00	5.50		
14	.205	80	16.40	34	6.97		34	6.97	52.00	10.66		
15	.183	80	14.64	34	6.22		34	6.22	52.00	9.52		
16	.163	80	13.04	34	5.54		34	5.54	52.00	8.48		
17	.146	80	11.68	34	4.96		34	4.96	52.00	7.59		
18	.130	80	10.40	34	4.42		34	4.42	52.00	6.76		
19	.116	80	9.28	34	3.94		34	3.94	52.00	6.03		
20	.104	80	8.32	34	3.54		34	3.54	52.00	5.41		
21	.093	80	7.44	34	3.16		34	3.16	72.00	6.70		
22	.083	80	6.64	34	2.82		34	2.82	72.00	5.98		
23	.074	80	5.92	34	2.52		34	2.52	72.00	5.33		
24	.066	80	5.28	34	2.24		34	2.24	72.00	4.75		
25	.059	80	4.72	34	2.01		34	2.01	72.00	4.25		
26	.053	80	4.24	34	1.80		34	1.80	72.00	3.82		
27	.047	72	3.38	34	1.60		34	1.60	72.00	3.38		
28	.042	72	3.02	34	1.43		34	1.43	72.00	3.02		
29	.037	72	2.66	34	1.26		34	1.26	72.00	2.66		
30	.033	72	2.38	34	1.12		34	1.12	72.00	2.38		
31	.030	72	2.16	34	1.02		34	1.02	80.00	2.40		
Total			$645.52		$275.00	$370.52		$169.93		$143.77	$26.16	$396.68

tree on other property. If twelve fully productive trees are planted per acre, the net present value for the acre would be $3,121.68 ($260.14 x 12). Compensation for the appraised value of the land without the trees and compensation for improvements to the land (usually the present cost of reproducing the improvement) would also be paid to the owner. Improvements to the land include irrigation systems, cleaning houses, and equipment sheds.

Discussion

The figures utilized to estimate additional cost and financial loss were obtained from extension specialists and producers. Production practices and markets differ for each producer, thus the above analysis should be used as a guide. Producers should insert their own figures into the analysis to determine their additional cost and financial loss due to tree loss.

Additional cost and financial loss will vary as different discount rates alter present value factors over the life of a tree. These factors are given in Table 2. The producer should utilize the discount rate that is applicable for his situation.

Variations of this method may be used in determining casualty losses for IRS purposes. A casualty is defined by the IRS as a complete or partial destruction or loss of property resulting from an identifiable event that is damaging to property and is sudden, unexpected, or unusual in nature. Therefore, the loss of a pecan tree is considered as a partial loss in a pecan operation. The allowable casualty loss deduction for a pecan tree would be the lower of the remaining book value (cost-depreciation taken) or the decrease in the fair market value of the tree lost.

Note that the IRS does not allow the producer to declare a loss on anticipated future income or to claim a casualty loss on trees already fully depreciated. The producer should always contact a local IRS representative to discuss his particular situation.

This method of estimating loss appears to be particularly applicable to producers in eminent domain proceedings. The powers of eminent domain (condemnation) allow government to take private property for the general public good or interest. The private owner must be justly compensated for his loss. Just compensation represents the current estimated value of the property to the owner. The value is usually determined via an appraisal. The net present value of total loss may be used as an estimate of compensation for owners whose pecan trees are taken by eminent domain proceedings. If trees are taken and the producer will plant an equal number of trees in another planting, the owner must be justly compensated for the trees lost. However, if the owner was not intending to plant new trees, the discounted net return of the trees lost (Tables 3 and 4, column 6) would not represent just compensation because income and costs are discounted for only thirty-one years. For the discounted net return of the trees lost to represent just compensation, income and costs must be discounted for the entire expected life of the

Table 4. Estimated net present value of total loss from losing a 15-year old pecan tree.

	Column											
	1	2	3	4	5	6	7	8	9	10	11	12
Years after re-planting	Present value factor @ 12% discount rate	Expected income if tree had lived: average #/tree @ 80¢/lb.	Present value of expected income (1 x 2)	Grove care cost if tree had lived	Present value of grove care cost (1 x 4)	Discounted net return of tree lost (3-5)	Expected grove care cost of reset tree	Present value of grove care cost (1 x 7)	Expected income from reset tree	Present value of expected income (1 x 9)	Discounted net cost of reset tree (8 − 10)	Net present value of total loss from tree lost (6 + 11)
1	.893	$52	$46.44	$34	$30.36		$15	$13.40	$ 0.00	$ 0.00		
2	.797	52	41.44	34	27.10		10	7.97	0.00	0.00		
3	.712	52	37.02	34	24.21		10	7.12	0.00	0.00		
4	.636	52	33.07	34	21.62		10	6.36	0.00	0.00		
5	.567	52	29.48	34	19.28		10	5.67	0.00	0.00		
6	.507	52	26.36	34	17.24		10	5.07	0.00	0.00		
7	.452	72	32.54	34	15.37		10	4.52	0.00	0.00		
8	.404	72	29.09	34	13.74		34	13.74	24.00	9.70		
9	.361	72	25.99	34	12.27		34	12.27	24.00	8.66		
10	.322	72	23.18	34	10.95		34	10.95	24.00	7.73		
11	.287	72	20.66	34	9.76		34	9.76	24.00	6.89		
12	.257	72	18.50	34	8.74		34	8.74	24.00	6.17		
13	.229	72	16.49	34	7.79		34	7.79	24.00	5.50		
14	.205	72	14.76	34	6.97		34	6.97	52.00	10.66		
15	.183	72	13.18	34	6.22		34	6.22	52.00	9.52		
16	.163	72	11.74	34	5.54		34	5.54	52.00	8.48		
17	.146	80	11.68	34	4.96		34	4.96	52.00	7.59		
18	.130	80	10.40	34	4.42		34	4.42	52.00	6.76		
19	.116	80	9.28	34	3.94		34	3.94	52.00	6.03		
20	.104	80	8.32	34	3.54		34	3.54	52.00	5.41		
21	.093	80	7.44	34	3.16		34	3.16	72.00	6.70		
22	.083	80	6.64	34	2.82		34	2.82	72.00	5.98		
23	.074	80	5.92	34	2.52		34	2.52	72.00	5.33		
24	.066	80	5.28	34	2.24		34	2.24	72.00	4.75		
25	.059	80	4.72	34	2.01		34	2.01	72.00	4.25		
26	.053	80	4.24	34	1.80		34	1.80	72.00	3.82		
27	.047	80	3.76	34	1.60		34	1.60	72.00	3.38		
28	.042	80	3.36	34	1.43		34	1.43	72.00	3.02		
29	.037	80	2.96	34	1.26		34	1.26	72.00	2.66		
30	.033	80	2.64	34	1.12		34	1.12	72.00	2.38		
31	.030	80	2.40	34	1.02		34	1.02	80.00	2.40		
Total			$508.98		$275.00	$233.98		$169.93		$143.77	$26.16	$260.14

tree; not just to its maturity of thirty-one years of age as shown in column 6. Also, if the tree is not replanted the costs and returns associated with the new tree (columns 7 through 10) are ignored. Producers are advised to discuss this method with their appraiser and taxing authorities before utilizing the method for compensation purposes.

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