Section 2
Estimating the Use Value of Horticultural Land

Unlike the annual investments made in traditional agricultural enterprises, most horticultural investments extend over many years. SLEAC provides use-value estimates of horticultural land devoted to orchard use. Unlike agricultural land, the data required for the estimation of orchard use values are largely unavailable from published, secondary sources. Therefore, these estimates are based largely upon the professional opinion of Virginia Cooperative Extension and Department of Horticulture personnel knowledgeable in the area of apple and peach production.

For land devoted to vineyards and nurseries where data limitations make the estimation of use values problematic, SLEAC does not provide explicit use-value estimates. Instead, it recommends that each jurisdiction impute vineyard and nursery use values from the use-value estimates published for agricultural land. The use value of the vineyard or nursery items on the land (i.e., trees, plants, etc.) may be appraised by a jurisdiction’s assessing officer and then added to the agricultural use value of the land.

The Composite Orchard

The composite orchard is based on a typical Virginia apple operation. The use values of other types of orchards (i.e., peach, cherry, pear, and plum) are imputed from the apple orchard values and adjusted by varying the depreciation rate. The profitability of apple orchards can vary substantially depending upon the type of operation (fresh or processed fruit), rootstock, planting density, age of the trees, and management practices. To further complicate matters, the data required to objectively establish a typical apple orchard are not available from secondary sources. Therefore, a typical apple orchard was subjectively defined by making the following assumptions:

1. The orchard is planted on a 20-year cycle with a planting density of 250 trees per acre using semi-dwarf rootstock.

2. The percent of the fruit sold to the processed market and fresh market is calculated annually as a 10-year moving average (3 year lag due to data availability). 30

3. The percent of trees in: pre-production (1-3 years), early production (4-7 years), full production (8-15 years), and late production age (16-20 years) is calculated annually from yields/cycle provided by Virginia Cooperative Extension.

Local adjustments to the use-value estimates applicable to orchards (Appendix B, Table 1b) may be necessary depending on the specific characteristics of the orchard being assessed.

Net Orchard Income

Unlike annual agricultural operations, perennial orchard enterprises require several years of capital investments prior to realizing any positive income flow. These initial investments greatly complicate the estimation of net returns. Capital investments made during the pre-production years are assumed to be borrowed through regular financial channels at the same long-term interest rate used in the agricultural budgets. It is assumed that this debt is paid down in later years when the annual net return to the orchard enterprise becomes positive.

Appendix C, Table 4 shows the annual input costs incurred in the production of both processed and fresh market apples for the four production stages. The initial establishment costs are assumed to be the same for both production types and are averaged into the pre-production costs. Total revenue is calculated for each year within a cycle by multiplying the price received by yield (lbs/acre). Annual production costs (Total Fixed and Variable Costs) are subtracted from annual total revenues to arrive at an Annual Net Loss/Income (values in parentheses represent a net loss). For example, in TY2010 a typical apple orchard processing market apples (i.e., Market Apple Production) for its Pre-Production Cycle (1-3 years) realized an annual net loss of ($1,785.35) per acre. And, for its Full Production Cycle (7-15 years) had an annual net income of $880.85 per acre (Appendix C, Table 4).

A summary of the per-acre net returns for each of the four production stages is provided in Appendix C, Table 5 – Section 1.

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**Capitalization Rate**

The capitalization rate used for determining the use value of orchards consists of the capitalization rate used for agricultural land for a given tax year plus a depreciation component. The depreciation component provides for recovery of the capital invested in an asset that declines in productivity with age. The effect of the depreciation component is to assign lower use values to orchards comprised of trees with a shorter productive life. SLEAC assumes a productive life of 20 years for apple trees as well as peach, cherry, pear, and plum trees. The depreciation component is 0.033 for apple trees and 0.05 for all other trees. The depreciation components are applicable only to trees since land value does not generally depreciate over time.

**Calculating Use Values**

While per acre net returns and capitalization rates have been determined, the procedure is different than it was for agricultural land since the calculated orchard net return is for trees and land. A few more steps are required.

First, the depreciation components can only be applied to the net returns of trees only. Because the orchard net return (Appendix C, Table 5 – line 3a) is a combination of trees and land, the net return from equivalent agricultural land must be subtracted prior to capitalizing. The net return equivalent agricultural land is calculated by dividing a jurisdiction’s net return for agriculture land by its soil index factor (Appendix C, Table 5, line 3b). That value is then subtracted from the net return to trees and land (Table 5, line 3a) and results in the net return attributable to trees only (Table 5, line 3c).

Second, a separate land class index scale for orchards is applied. Orchard production is most successfully accomplished on land with specific attributes. Of particular importance is the landscape. General agreement among professionals familiar with the orchard industry is that Classes II through IV lands are best for commercial fruit production. Class I land often lacks adequate air drainage while the poor soil and steep slope of Class V through VII lands often make production costs prohibitive.

As with the use-value estimates for agricultural land, SLEAC elected to use an index to adjust the use value of land devoted to orchards for the various land classes. SLEAC approved the following index to adjust orchard use-value estimates for the various land classes relative to the base classes.

<table>
<thead>
<tr>
<th>Virginia Land Class Index (Orchards)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class I</td>
</tr>
<tr>
<td>Class II – IV</td>
</tr>
<tr>
<td>Class V</td>
</tr>
<tr>
<td>Class VI</td>
</tr>
<tr>
<td>Class VII</td>
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<tr>
<td>Class VIII</td>
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</tbody>
</table>

These indices can be interpreted in the same fashion as the indices for agricultural land. Class II, III, and IV land is considered the base and, therefore, receives the index of 1. Net returns to orchards on Class I land are estimated at 80 percent of the base, net returns to Class V land are estimated at 75 percent of the base, and so on.

Calculating a jurisdiction’s use value of orchards land is outlined in the four steps presented below. Calculations are shown in Appendix C, Table 5.

**Step 1 – Calculate net returns for orchard land**

The first step in estimating the use value of orchard land is to determine the average net returns per acre for the previous 7 years. Annual net return budgets for orchards are averaged using a moving 7-year Olympic average. For TY2010, Prince Edward County’s net return average for orchard was $13.74 (Table 5 – line 3a).

**Step 2 – Calculate the portion of use value attributable to trees only**

The amount calculated in Step 1 represents the average net return per acre of both trees and agricultural land. Since the depreciation component of the capitalization rate applies only to trees, net returns to agricultural land are subtracted prior to applying the capitalization rate.

For TY2010, Prince Edward County’s Estimated Net Returns for agricultural land were $3.60 (see Prince Edward County’s TY2010 Table 3 – line 1, http://usevalue.agecon.vt.edu/estimatesTY2010.htm). Also,

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31See in this document: Section 1 – Capitalization Rates
see that its soil index factor was 1.149. Dividing the county’s Estimated Net Return by its soil index factor, results in a Net Return for only agricultural land of $3.13. Subtracting $3.13 from the orchard net return of $13.74 yields the portion of net return attributable to trees only which is a net gain of $10.61 (Appendix C, Table 5 – line 3c).

Each jurisdiction uses two capitalization rates - one for apple trees and another for other trees. Each rate is the sum of the state’s annual moving straight 10-year average of the long-term interest rates and the jurisdiction’s moving straight 10-year average of its effective property tax rate (published annually by the Virginia Department of Taxation) plus a depreciation rate.

For TY2010, Prince Edward County’s average long-term interest rate was 0.0734 and its average effective property tax rate was 0.0043 (Appendix C, Table 5 – lines 4a and 4b), summing the two results in a capitalization rate of 0.0777. Then, separate depreciation rates for apple trees and other trees are added. For apple trees, 0.0333 is added and 0.05 added for other trees, resulting in final capitalization rates of 0.1110 for Apple Orchard and 0.1277 for Other Orchard (Appendix C, Table 5 – lines 4e and 4f).

**Step 3 – Multiply by the appropriate index number**

Dividing the net return calculated for trees only (Appendix C, Table 5 - line 3c) by the Apple Orchard and Other Orchard capitalization rates (Appendix C, Table 5 - lines 4e and 4f, respectively) results in apple trees and other trees estimates for Class II, III, and IV land. The remaining estimates (Class I and V-VIII) are calculated by multiplying the Class II – IV estimate (which are all the same) by a corresponding Orchard Index (Appendix C, Table 5 - Section 5).

For TY2010, in Prince Edward County, the net return attributable to trees only is a net gain of $10.61 (Appendix C, Table 5 – line 3c). Dividing this amount by the capitalization rates for Apple Orchard and Other Orchard (0.1110 and 0.1277) results in the reported use values for apple trees and other trees (TY2010 Table 5 - Section 5). The estimates for apple trees and other trees are shown as net gains for Land Classes II, III, and IV ($95.58 and $83.07). Multiplying these amounts by the corresponding orchard index for the remaining land classes results in the county’s estimates for apple trees and other trees (Appendix C, Table 5 – Section 5).

**Step 4 – Add the appropriate agricultural land use-value estimate**

The total use value of Apple Orchard real estate for a jurisdiction is calculated by combining the jurisdiction’s use-value estimate attributable to apple trees and its use-value estimate attributable to agricultural land (without risk).

As stated, for TY2010 in the Prince Edward County the apple tree estimates (Land Classes II, III, and IV) each show a net gain of $95.58 (Appendix C, Table 5 – Section 5). This value is multiplied by the corresponding Orchard Index (second column) to calculate for the remaining land class estimates for apple trees.

For apple trees and land estimates, each apple tree value for Class I thru VIII is added to the corresponding Land Class use-value estimate for agriculture land (without-risk) (see Prince Edward County TY2010 Table 3 – Section 5, http://usevalue.agecon.vt.edu/estimatesTY2010.htm). Summing the two for each land class provides the apple trees and land estimate of $136.98 (Land Class I, $76.46 + $60.52); $150.05 (Land Class II, $95.58 + $54.47); $135.92 (Land Class III, $95.58 + $40.35) and so on (Appendix C, Table 5 - Section 5).

Finally, for Apple Orchard each apple trees and land estimate is rounded to the nearest $10, resulting in use-value estimates of $140 (Land Class I); $150 (Land Class II); $140 (Land Class III) and so on, which is the use-value estimate reported (Appendix B, Table 1b Prince Edward County – Apple). The same process is used in generating use-value estimates for each of the remaining capability classes.

The total use value of Other Orchard real estate for a jurisdiction is calculated the same way as is Apple Orchard except that use-value estimates attributable to Other Trees are used.

**References**

