# EARTH-KIND® GRAPES:
# RESEARCH OVERVIEW

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## Goal

The goal of this research study is to identify grape cultivars for homeowner use that are aesthetically pleasing, produce high-quality fruit for fresh eating, making jelly or wine, are easy to maintain, conserve water, and provide the ultimate in research-based environmental protection.

## Experimental Design

The randomization and blocking of the study reduces experimental error by accounting for undesirable variability in the field, thus allowing for a robust statistical analysis and more precise results. For example, the soil conditions across a field can vary, or one end of the experimental area may be lower and thus remains wet longer. The remedy? Divide the field into several smaller blocks. The growing conditions within a block are apt to be much more uniform than across an entire field - thus fewer unwanted variables and a stronger experimental design.

Randomized complete block, the experimental design chosen for this study, is the strongest design possible for field research.

Each research site should consist of four blocks, and each block should contain two consecutive vines of each cultivar. The planting order should be rerandomized for each block. This is to ensure that no particular cultivar always occurs at the same position within the block. For example, it could skew the results if a given cultivar was always planted at the edge of the plot (where it would receive more air circulation and thus have less chance of disease).

Here is the easy way to randomize the planting order for each block. Copy the list of cultivar names included later in this document, and then paste the list into Part 1 of the RANDOM.ORG List Randomizer (http://www.random.org). Click on the Randomize button and voila, the list of cultivars will be randomized which gives you the planting order for Block 1. Hit the Again! button and the list will be rerandomized which results in the planting order for Block 2. Repeat this same

procedure for Block 3 and Block 4.

Randomization Example:

Cultivars used in this example: Cultivar A, Cultivar B, Cultivar C, Cultivar D, and Cultivar E.

| **Block 1** | **Block 2** | **Block 3** | **Block 4** |
|---|---|---|---|
| Buffer plant | Buffer plant | Buffer plant | Buffer plant |
| Cultivar B (2 plants consecutive)* | Cultivar C (2 plants consecutive) | Cultivar A (2 plants consecutive) | Cultivar E (2 plants consecutive) |
| Cultivar C (2 plants consecutive) | Cultivar E (2 plants consecutive) | Cultivar E (2 plants consecutive) | Cultivar B (2 plants consecutive) |
| Cultivar E (2 plants consecutive) | Cultivar D (2 plants consecutive) | Cultivar C (2 plants consecutive) | Cultivar D (2 plants consecutive) |
| Cultivar A (2 plants consecutive) | Cultivar B (2 plants consecutive) | Cultivar D (2 plants consecutive) | Cultivar A (2 plants consecutive) |
| Cultivar D (2 plants consecutive) | Cultivar A (2 plants consecutive) | Cultivar B (2 plants consecutive) | Cultivar C (2 plants consecutive) |
| Buffer plant | Buffer plant | Buffer plant | Buffer plant |

* Two plants of this same cultivar planted consecutively in the row.

**Buffer Plants**

The purpose of a buffer plant is to preclude having experimental vines on the ends of the rows where they might skew the results by receiving more sunlight and air movement than do the other experimental vines. A buffer vine should be planted at the beginning and end of each row. Any experimental cultivar under study may be used as a buffer. No data is collected on buffer vines.

**Physical Arrangement of Blocks**

The blocks can be arranged as a single row of vines with all four blocks end to end, two rows with two blocks each, or four rows with one block each. The rows do not need to be straight and oriented in the same direction, but a spacing of 10' between rows should be maintained throughout the length of parallel rows.

Arrangement Examples:

IN-LINE METHOD

**Block 1**
X
X
X
X
X

**Block 2**
X
X
X
X
X

**Block 3**
X
X
X
X
X

**Block 4**
X
X
X
X
X

SIDE-BY-SIDE METHOD (2 rows)

| **Block 1** | **Block 3** |
|---|---|
| X | X |
| X | X |
| X | X |
| X | X |
| X | X |

| **Block 2** | **Block 4** |
|---|---|
| X | X |
| X | X |
| X | X |
| X | X |
| X | X |

SIDE-BY-SIDE METHOD (4 rows)

| **Block 1** | **Block 2** | **Block 3** | **Block 4** |
|---|---|---|---|
| X | X | X | X |
| X | X | X | X |
| X | X | X | X |
| X | X | X | X |
| X | X | X | X |

## Spacing

The suggested spacing is to have the vines 8 ft. apart on centers within the row, with the rows 10 ft. apart on centers. This spacing provides adequate room between vines and rows to accommodate vigorous vine growth without overcrowding.

## Area Required

The total area required for this study at any one research site (i.e. the rows of vines and the walkways, including a four-foot walkway completely around the study) is approximately 10,500 square feet for the in-line method, approximately 8,500 square feet for the side by side 2-row method, and approximately 7,700 square feet for the side by side 4-row method.

## Site Selection

The site selected needs 8 hours or more of full, direct sun each day, and good air movement over and through the vine canopies. Avoid planting in low areas of the field as that is where the cold air will settle and cause unnecessary frost and freeze damage, and do not plant in waterlogged soils.

## Experimental Cultivars

The cultivars selected for this Earth-Kind research trail consist of both bunch grapes (*Vitis* spp.) and muscadines (*Muscadinia rotundifolia*), all of which are reputed to have excellent pest resistance (including Pierce's Disease), as well as outstanding heat, drought, and soil tolerance. Because of its excellent track record of performance and widespread climatic adaptability, Champanel has been chosen as the control cultivar for this research.

The following nine cultivars have been selected for evaluation:

**Champanel**: Interspecific hybrid (*V. champinii* x 'Worden') developed by T.V. Munson in 1893. Medium to large clusters with large black berries. The fruit of Champanel makes excellent jelly, and can be used to make a fruity flavored wine.

**Herbemont**: *V. bourquiniana* hybrid developed by Nicholas Herbemont, 1771-1839. Medium-sized clusters with reddish brown berries. Herbemont makes a nice white wine and may be used for jelly typically with purple or black colored grapes added for color.

**Lake Emerald**: Interspecific hybrid ('Pixiola' x 'Golden Muscat') released by the University of Florida in 1954. Large clusters of small green berries that turn yellow with advanced maturity. Lake Emerald was developed as a white wine grape cultivar.

**Lomanto**: Interspecific hybrid ('Salado' x 'Pense') developed by T.V. Munson in 1902. Compact clusters with small black berries. Lomanto makes an exceptionally deep colored red wine and may be used for making jelly.

**Miss Blanc**: Interspecific hybrid 'Galibert 261-12' x ('Extra' x 'Marguerite' seedling) released by Mississippi State University in 1982. Medium-sized clusters with large white- to green-colored berries. Miss Blanc produces an intermediate white wine and may also be used as a juice grape.

**Nesbitt**: Self-fertile muscadine cultivar released by North Carolina State University in 1985. Nesbitt has large black berries that ripen over a period of three weeks and is primarily used for fresh eating and jelly.

**Southern Home**: Complex hybrid ('Summit' x P-9-15) with muscadine and *V. vinifera* parentage. Released by the University of Florida in 1994. Medium-sized clusters with small (for a muscadine) black berries with a crisp texture. Southern Home may be used for fresh eating or winemaking.

**Tara**: Self-fertile muscadine cultivar released by the University of Georgia in 1993. Large bronze berries primarily used for fresh eating and jelly.

**Triumph**: Self-fertile muscadine cultivar released by the University of Georgia in 1980. Medium-sized bronze berries with a pinkish hue that are primarily used for fresh eating and jelly.

## Number of Plants

The total number of plants (experimental plus buffers) required at each site is 74 for the in-line blocking method (1 row), 76 for the side by side method with 2 rows, and 78 for the side by side with 4 rows.

## Soil Management

Earth-Kind Environmental Soil Management principles and techniques will be utilized in this research.

Soil Testing: Please have a soil test run before planting, after three years, and at the end of the study.

Initial Clearing of Planting Rows: When grass and weeds are actively growing, apply glyphosate to vine rows in a 4' wide strip. Leave existing grass (6'wide strip) in the row middles. If persistent perennial weeds (e.g. bermudagrass) are present, make two applications of glyphosate at the high rate. Read and follow all label directions. Once the grass and weeds are completely killed, simply till them into the soil prior to incorporation of the compost.

Amending the Soil: Till in three inches of fully-finished, plant-derived compost, one time only, prior to planting in a 4'wide strip for each row.

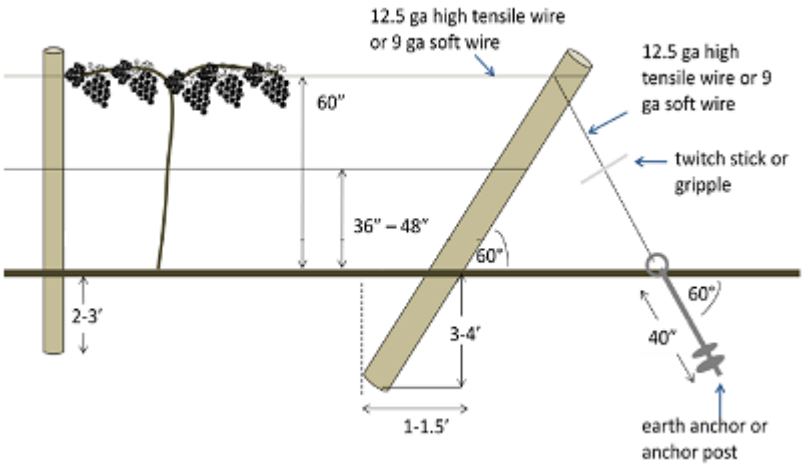
Fertilizers: NO commercial fertilizers of any kind (i.e. no synthetic, no organic) should be applied.

Mulching: Maintain three inches of native tree mulch year-round. The term native tree mulch refers to tree limbs, preferably with the leaves still attached, that have been run through a chipper, such as can be obtained, often free of charge, from tree service companies or cities. Each year, or even twice a year, add more mulch to maintain the three-inch thickness.

## Trellis Construction and Cost

The plant support structure needed for this study is known as a high wire cordon trellis. The materials used to construct the trellis can consist of wood and/or metal, but it is best to avoid landscaping timbers because they are prone to failure in a short period of time. Line post spacing typically varies from 16' to 32' depending on the strength of the post. For the load-bearing wire (top wire), 12.5 gauge high tensile or 9 gauge soft wire should be used. The size and type of the other wire(s) is not as important as they are not load bearing.

High Wire Cordon Trellis Example:




Materials List and Estimated Cost of Evaluating 9 Cultivars in a 4-Row Design

| Description | Unit Cost | Quantity | Total Cost | Source |
|---|---|---|---|---|
| End posts (6" x 8') treated | $15.00 | 8 | $120.00 | Lowes |
| Line posts (4" x 8') | $8.00 | 24 | $192.00 | Lowes |
| End post anchor assembly and duck bill anchor | $11.30 | 8 | $90.40 | Orchard Valley Supply |
| High tensile 12.5 gauge wire (5000' roll) | $90.00 | 1 | $90.00 | Tractor Supply |
| 6' bamboo vine stakes (bundle of 100) | $50.15 | 1 | $50.15 | Orchard Valley Supply |
| Ratchet wire strainers | $5.00 | 4 | $20.00 | Orchard Valley Supply |
| Medium Gripple | $0.99 | 16 | $15.84 | Orchard Valley Supply |
| H-Curls for irrigation hose support (box of 500) | $27.45 | 1 | $27.45 | Orchard Valley Supply |
| Tension springs | $5.75 | 4 | $23.00 | Orchard Valley Supply |
| 1 ¼ " fencing staples (100 ct.) | $8.00 | 1 | $8.00 | Lowes |
| 1/2" polyethylene irrigation tubing (500') | $42.97 | 1 | $42.97 | Lowes |
| 1/2" polyethylene irrigation tubing (200') | $14.97 | 1 | $14.97 | Lowes |
| Irrigation tubing fittings (varies by system design) | - | - | $15 | Lowes |
| 1 gph pressure-compensating emitters (50) | $15.63 | 2 | $31.26 | Lowes |
| Mulch (hopefully obtain free of charge) | ??? | ??? | ??? | ??? |
| Grapevines (muscadines only) | $8.00 | 32 | $256.00 | - |
| **Grand Total** | | | **$997.04** | |

*Other materials may be used so long as the general trellis design remains the same.
Orchard Valley Supply: http://www.orchardvalleysupply.com/

## Irrigation

Once the vines are established (which typically takes 12 months), our goal is to document excellent plant performance with a 70% reduction in irrigation, as compared to the average homeowner using overhead sprinklers. To achieve this tremendous water savings, it is imperative that drip irrigation is utilized in this study.

The specific design of the drip irrigation system is flexible. At least one ½ gallon per hour or 1 gallon per hour emitter per vine is recommended. Place drip tubing directly onto the soil surface, then apply mulch to cover the soil surface as well as the irrigation tubing.

Frequency of irrigation once plants are established is once every two months as needed.

## Pesticides

No pesticides of any kind (i.e. no fungicides, insecticides, miticides, or oils) should ever be applied to the plants. An herbicide containing glyphosate can be used to clear the planting area initially and as needed to prevent the encroachment of perennial weeds (e.g. bermudagrass, Johnson grass). Read and follow all label directions.

## Timeline

The suggested timeline for establishment of the study is as follows:

Spring to Fall 2014: Soil testing, site preparation, trellis installation

Fall 2014 to Spring 2015: Planting, irrigation system installation, mulching

Summer to Fall 2015: Grapevine training (once a month or as needed)

Late Winter 2016: Pruning

Spring to Fall 2016: Grapevine training (as needed)

Late Winter 2017: Pruning

Summer 2017 - Harvest

## Duration of Study

The duration of this study is 5 years from planting. Grapevines typically produce a crop in the third year after planting, and at least two years of fruit production are required for a thorough evaluation.

## Data Collection

Data will be collected every other month during the growing seasons of 2016, 2017, and 2018. I will provide detailed evaluation sheets for your use. To reduce your workload, I will conduct a webinar to train your Master Gardeners so that they can take all of the data.

## Publications

Each trial site coordinator will be included as a coauthor on all scholarly work (e.g. abstracts, peer-reviewed journal articles) that arises from this study.

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