

**Title: Use of Dura-Line monofilament as a replacement for high-tensile wire in
trellis construction and netting support with small fruit crops**

Final Report

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Extension Proposal

Name, Mailing and E-mail Address of Principal Investigators:

David W. Lockwood
Dept. of Plant Sciences
University of Tennessee
252 EPS, 2431 Joe Johnson Dr.
Knoxville, TN 37996-4561
E-mail: dlockwood@utk.edu

Co-Investigators:

Jim Wills (retired)
Dept. of Biosystems Engineering & Soil Sciences
Univ. of Tennessee
110 Ag. Engineering Bldg.
Knoxville, TN 37996-4531
E-mail: jwills@utk.edu

Gary Honea (retired)
Dept. of Biosystems Engineering & Soil Sciences
108 Ag. Engineering Bldg.
Univ. of Tennessee
Knoxville, TN 37996-4522
E-mail: ghonea@utk.edu

Finis Stribling
Tennessee State University
3500 John A Merritt Blvd.
Nashville, TN 37209
E-mail: FSTRIBLING@tnstate.edu

Objectives:

- 1) To demonstrate the use of Dura-Line monofilament as a replacement for high-tensile wire for use as cropload wires, catch wires and irrigation line support wires in small fruit crop trellising.
- 2) To evaluate the use of Dura-Line monofilament as support for crop netting used for bird control in small fruit crops.
- 3) To develop equipment and methods for use in putting out wires for trellises and netting support in small fruit crops.

Justification and Description:

Support systems (trellises) are used in several small fruit crops (grapes, blackberries, raspberries) to support fruiting canes, as catch wires to orient new growth for optimal light interception and shade prevention in the fruiting zone and to suspend trickle irrigation lines so they are less apt to be damaged in ground maintenance operations.

Bird damage is becoming an increasing problem in most small fruit crops and netting applied prior to fruit ripening and maintained through harvest is becoming more of an economic necessity for many growers. For optimal results, the netting needs to be suspended above the crop canopy.

High tensile steel or aluminum wires of various gauges have been used in trellising and netting support. Wires are expensive to install due to the cost of the material and the difficulty involved in putting it in place and to maintain since they need to be retensioned annually to maintain their proper function. Wires are difficult to handle. They are heavy and can be dangerous due to the recoil that may occur if the wire should break. In addition, wires conduct electricity well so plant damage can be severe in the case of a lightning strike in the planting. Finally, corrosion is a serious concern with uncoated wires or where the coating is damaged as the wire is tightened and secured. Removal and disposal of metal wire when no longer needed can be a problem.

Dura-Line monofilament, manufactured by Bayer, is available in several gauges similar to metal wires for different uses in trellising and netting support. It has been used for several years in many European countries and found to be acceptable under their conditions. Monofilament has a cost advantage over metal wires. With proper equipment and techniques it may be possible to “string” several wires on two rows at the same time resulting in a substantial time savings. Unlike metal wire, monofilament does not require special hardware to secure it on end posts. In the event that it should get broken or cut, splicing it is not a difficult task. When properly installed and tightened, retensioning should not be necessary. Monofilament is much

lighter and less prone to dangerous recoil as metal wire if it should break or slip loose while being installed and tensioned. Due to its UV and weather resistance properties, monofilament has held up over 25 years in European vineyards. Other characteristics favoring monofilament are its freedom from corrosion and lack of electrical conductivity. If a planting is removed, the monofilament can be respooled for use at a future time or burned if no longer needed.

Methodologies:

Net Support

Demonstrations using 12.5 and 8 gauge monofilament line versus 12.5 gauge high-tensile wire for bird netting support were initiated in blueberry and grape plantings at the Highland Rim, Middle Tennessee and Plateau Research and Education Centers. For net support on individual rows, 24-inch extensions were fastened to end posts and line posts on the trellis.

Monofilament line and high-tensile wire were secured to the top of the extensions down the rows to position the net above the crop canopy. Where an entire block was encased in netting as opposed to individual rows, an extra post extending 8 feet above ground and 30 feet out from the end post were set at both ends of the rows and the monofilament lines and wire was extended out to them. Similarly, posts were set 10 feet beyond the outside rows with monofilament line or high-tensile wire at the top to allow netting to extend far enough out from the row to allow for equipment travel within the netted block.

Trellising

Both 12.5 gauge and 8 gauge monofilament lines were installed as the cordon wire on a VSP grape trellis at the Plateau Research and Education Center. High-tensile 12.5 gauge wire was used for comparison purposes. The high tensile wire was tensioned to 150 foot-pounds using a torque wrench and inline tensioners. The monofilament line was tensioned as per directions from the manufacturer. The following diagram illustrates the location of the treatments on rows 1 – 6 of the vineyard and the location of the measurement points for the high tensile wire and the monofilament lines:

Row 1	X	X	A	X	X	B	X	12.5 gauge high-tensile wire
Row 2	X	X	C	X	X	D	X	12.5 gauge high-tensile wire
Row 3	X	X	E	X	X	F	X	8 gauge Dura-Line
Row 4	X	X	G	X	X	H	X	8 gauge Dura-Line
Row 5	X	X	I	X	X	J	X	12.5 gauge Dura-Line
Row 6	X	X	K	X	X	L	X	12.5 gauge Dura-Line

16 ft. between trellis posts, total row length 224 ft.

Measurements of line sag were taken midway between the second and third and the fourth and fifth line posts using a Moultrie & Feeders Big Game Scale. The amount of sag using a ten-pound pull on the line was recorded for the various treatments.

Results:

Netting Support

Initial results showed that the 12.5 gauge monofilament was equivalent to the 12.5 gauge high-tensile wire. The 8 gauge monofilament exhibited less sag than the 12.5 gauge monofilament when used as netting support.

For the netting system over an entire portion of the vineyard, support posts had to be well-anchored to prevent leaning as the monofilament and high-tensile wire were tightened. Netting on grapes was applied prior to veraison and removed within 30 days following harvest. Netting on blueberries was applied in mid-June and remained on until mid-September. During this interval, no differences were detected in sag of the different materials.

Trellising

Sag in Line (Inches)

Rows		10/7/09	7/14/10	9/14/10	11/17/10
1	12.5 ga. High tensile	4.50	7.00	6.00	3.50
2	12.5 ga. High tensile	4.25	7.25	5.38	3.50
3	8 ga. monofilament	5.50	6.50	5.50	4.25
4	8 ga. monofilament	6.00	7.00	8.00	4.25
5	12.5 ga. monofilament	11.75	14.75	11.00	6.25
6	12.5 ga. monofilament	11.50	13.00	10.00	8.25

Weather conditions at the time of measurements:

- 10/07/09 cloudy, 55 F
- 7/14/10 sunny, 65 F
- 9/14/10 sunny, 90 F
- 11/14/10 partly cloudy, 50 F

The high tensile wire (HTW) and the Dura-Line 8 (DL-8) are similar in ability to resist sag over time, but the 12.5 gauge monofilament sagged much more than the high tensile with an equal stress. During the course of this study, temperatures had little effect on line tension.

Conclusions:

It appears that the 8 gauge Dura-Line is comparable to the high tensile wire in ability to maintain its tension over time. The 8 gauge monofilament could be substituted for 12.5 gauge high tensile wire as the load-bearing wire on a trellis. The 12.5 gauge monofilament would not be an acceptable substitute for the high tensile wire in load-bearing situations. However, the 12.5 gauge monofilament would be an acceptable option for netting support and for catch wires in trellises. It is simpler and quicker to install. With relatively little effort, supports and reels could be constructed that would allow putting several different wires on the trellis on two separate rows at one time. The current price of high tensile wire is approximately \$0.03 per foot, 12.5 gauge Dura-line is approximately \$0.02 per foot, and 8 gauge Dura-line is approximately \$0.06 per foot.

Over the time of the trial, which began in summer of 2008, no retensioning of either the high tensile wire or the monofilament line was done. A longer period of time will be needed to determine whether the monofilament will retain the original tensioning. Previous experience has demonstrated that high-tensile wires will need to be retensioned with time.

Impact:

The cost of materials for a trellis would be a bit higher for the 9 gauge monofilament as compared to high tensile wire. However, vine losses due to lightning damage would be reduced with the use of monofilament. The use of the 12.5 gauge monofilament for support systems in canberries and for catch wires in vineyards would be less expensive than using high tensile wire.

Because monofilament is easier and less dangerous to work with and because multiple lines could be strung at one time during trellis construction, a considerable savings could be recognized.

Citations

While no publications regarding this work have been published, demonstrations in both trellis and net support using monofilament line instead of high-tensile metal wire were included as part of field day presentations at the Middle Tennessee and Plateau Research and Education Centers.

