Engineering
FACTSHEET

BRITISH COLUMBIA
Ministry of Agriculture, Food and Fisheries

Order No. 336.100-1
Agdex: 235/677
June, 1992
Revised June 2004

INSTALLATION OF BIRD-PROOF NETTING FOR HORTICULTURAL CROPS

INTRODUCTION

Plastic netting can be used to provide a complete, virtually bird-proof enclosure around high-value fruit crops such as blueberries and grapes. Netting is a highly effective form of bird damage control which is noiseless, non-toxic and non-lethal to the birds. Netting can help to produce maximum yields in crops which are normally subject to serious bird damage.

HORTICULTURAL CONSIDERATIONS

In British Columbia, both blueberries and grapes are generally recommended to be grown on a ten foot row spacing. Even though growers may have narrower spacings, the structural recommendations given in this publication will be more than adequate for the narrower spacings. In discussions with many growers, it was established that an eight foot high netting system, with a one foot sag between support structures, would allow most growers to operate their standard equipment in the crops. Should higher clearances be required, the Resource Management Branch should be contacted. Considerable time is required to plan, order and install the bird netting system and ample time should be left before the actual date required for the bird-proofing system.

NETTING MATERIALS

Presently, there are two types of plastic bird netting sold in British Columbia. They are **Mission Valley Fruit Netting System** and **Conwed Birdnet**. Both types will do an adequate job of protection and each type must be rolled up or gathered at the end of the season.

1. **Mission Valley Fruit Netting System** is made of light blue polyethylene with a mesh size of one inch by one inch (25mm x 25mm). Each net is 328 ft. (100 metres) long and 12 feet (3.6 metres) or 24 ft. (7.2 metres) wide. The weight of the material is approximately 1.4 lbs per 1,000 square ft., when dry, or 2.5 lbs per 1,000 square feet when wet. The net comes with a series of side loops through which a wire is normally passed and adjacent panels tied together.

2. **Conwed Birdnet** is made of black polypropylene which has been treated to resist damage from ultraviolet light. It has a rigid 0.7 inch by 0.7 inch (18mm x 18mm) mesh and comes in 5,000 feet (1,525 metre) roll lengths which are either 14 feet (4.3 metres) or 17 feet (5.2 metres) wide. The weight of the material is approximately 2.75 lbs per 1,000 square feet, when dry, or 4.25 lbs per 1,000 square feet when wet. The net is rolled out on support wires with a one foot overlap between panels. The panels are then fastened together with 8 inch long, "L" shaped hooks. Ensure that panels overlap in the predominant downwind direction.

TRELLIS SUPPORT SYSTEMS

Several approaches can be taken in adequately supporting the netting material. Even though the material itself is very light, the additional wire, water and wind loads require a sturdy support structure. It should be noted that wire will always sag and only with increased wire tensions, and therefore added support loads, will the sag decrease. For practical reasons, it is assumed that a one foot sag in a 100 foot span is acceptable.

To achieve a sag of one foot or less per 100 feet, each support wire must be tensioned to 100 lbs at the time of installation. High tensile, 12½ gauge wire should be used as it will not stretch as much under load. It is very important that the wire by heavily galvanized (Class III) to prevent wire from rusting and snagging the netting as it is dispensed. A 100°F fluctuation from 80°F in the summer to -20°F in the winter, will increase the wire tension by approximately 100 lbs. If wires are installed with 100 lbs of tension in the spring when temperatures are 40°F, then tension will be 60 lbs when temperatures are 80°F and 160 lbs when temperatures are -20°F.

When encountering undulating terrain, special consideration may have to be given to wire tension, wire hold-downs and additional in-field support members.

The two most common approaches to the trellis support system are the **perimeter cable system** and **the post and anchor** or **brace system**. Each system is outlined below.

1. **The Perimeter Cable System** consists of large corner posts and additional end posts which support a $^{3}/_{8}$ inch cable. The trellis wires are attached to the cable. Cross wires, every 300 feet, properly anchored on the sides, are supported in the field with 2 x 2 wooden stakes on a grid pattern of approximately 50 feet by 300 feet. A typical layout is shown in Figure 1.

   The corner posts must be at least 12 inches in diameter (preferably 16+ inches), 14 feet long and driven six feet into the ground. Corner posts should be slanted outward and properly anchored as there are forces of 6,000 lbs or more on these posts. At intervals of ten rows or 100 feet, additional eight to ten inch diameter posts must be set at the end of the field to support the cable.

   Again, these posts must be set 6 feet into the ground and anchored. Two trellis wires, every twenty feet for the Mission Valley Fruit Netting System, or one wire every ten feet for the Conwed Birdnet, are attached to the end cables and tensioned to 100 lbs.

   Heavy equipment will be required to install the large corner posts and end posts. Cables must be tensioned to approximately 5,000 lbs. This system should be installed by a contractor who is familiar with the loadings and tensions encountered and has the equipment and necessary tensioners to install the posts, cables and wires. The advantages are that fewer posts are used and the number of interior posts can be reduced to allow for use of low level, mechanical harvesting equipment. Should one major part of the support system fail, however, specialized heavy duty equipment will be needed to make the necessary repairs.

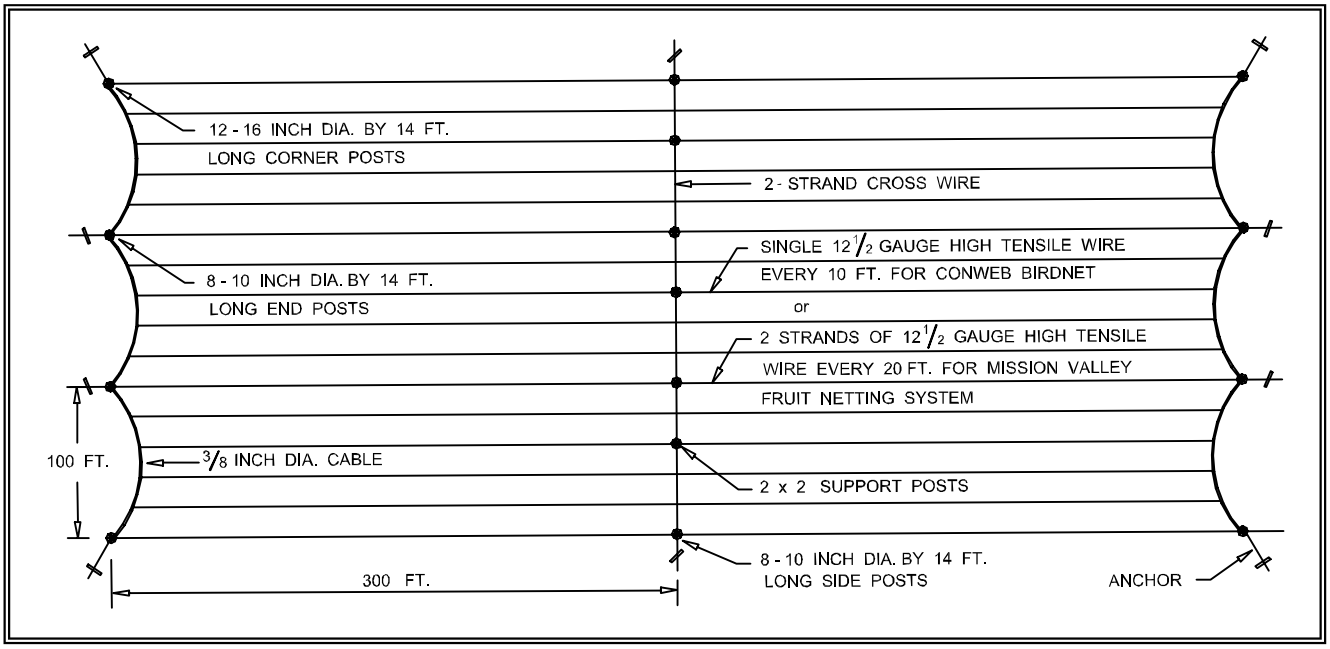


Figure 1 **Perimeter Cable Trellis System**

2. **The Post and Anchor**, or **Brace System,** consists of an anchored post for every wire or set of wires with 2x2 support posts in the field at 150 foot intervals. Cross wires, properly supported and anchored, may be required at 300 foot intervals to prevent the netting from shifting. A typical layout is shown in Figure 2.

There are two end support options which can be used. In the **Post and Anchor System**, the anchors are rotated into the ground. A four foot long earth anchor, with a 6 inch diameter spiral disc, can hold the tension forces from the wires even in peaty soils. Mineral soils may not require the same length of anchors. The other option which may be used is the **Post and Brace System**. In this system, the diagonal braces will normally act to rotate the end post out of the ground and, to prevent this from happening, the posts must be longer and driven deeper into the ground. A two foot long backing post must be installed to prevent the brace from slipping into the ground. Either end post assembly will work, however, the anchor method is, by far, the stronger and it keeps the total field open for working under the net. See Figure 3 and Figure 4 for details of these two options.

More posts are required in this trellising system; however, any grower can install and/or repair the system without the use of specialized equipment. The collapse of one post has a minimal effect on the rest of the system. More 2x2 support posts may be required and these may give more interference if mechanized harvesting with a low machine is anticipated.

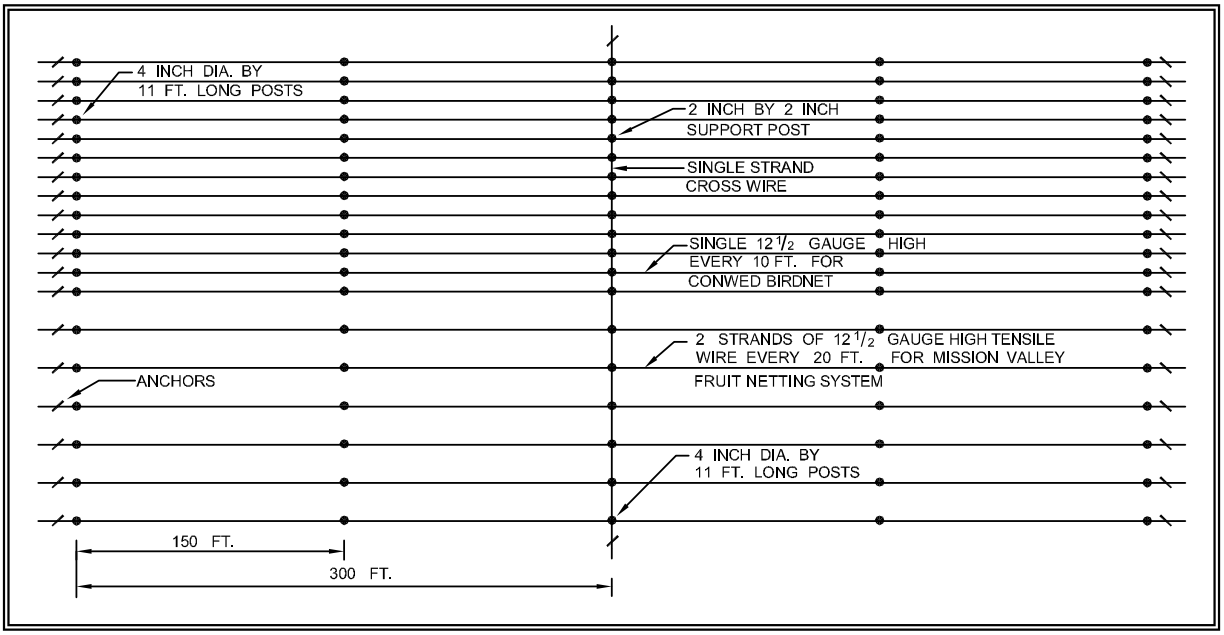


Figure 2 **Post and Anchor or Brace Trellis Support System**

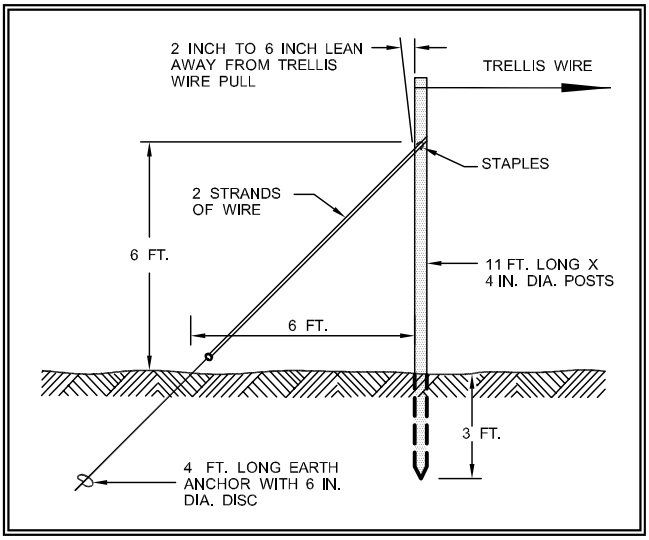


Figure 3 **Details of the End Support Options**
Post and Anchor system

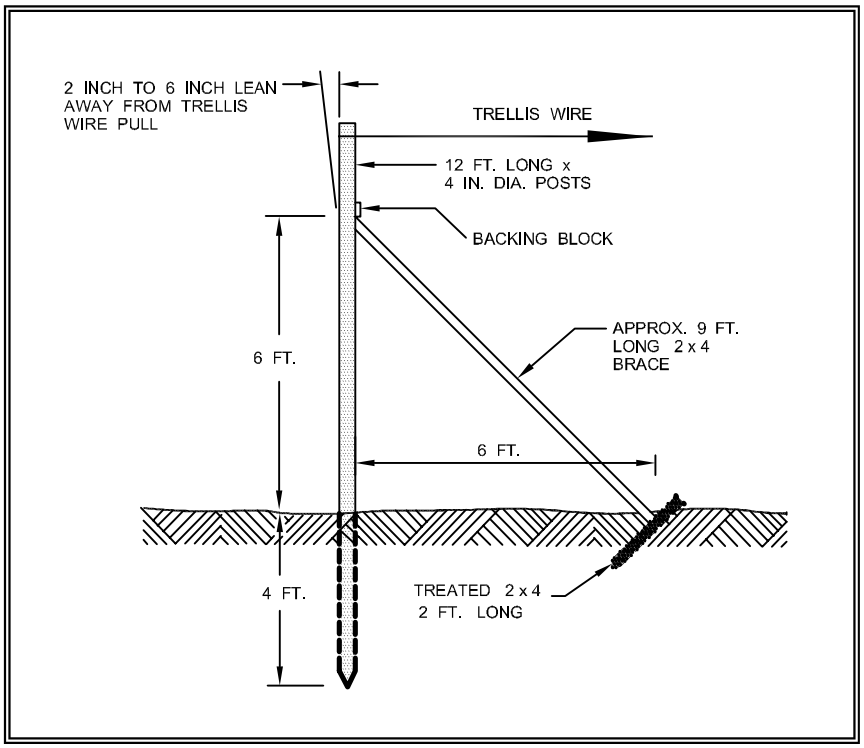
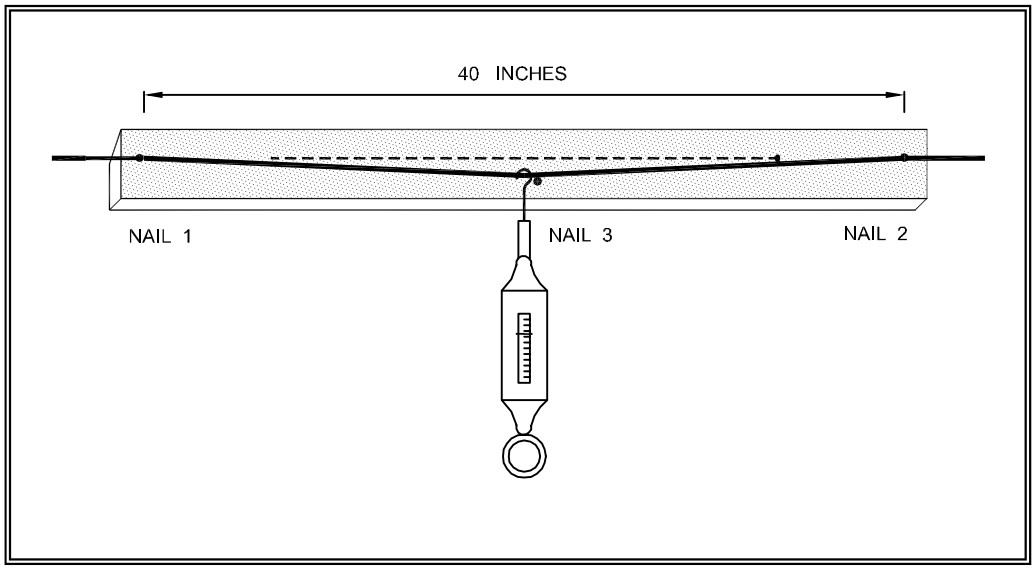


Figure 4 **Details of the End Support Options**
Post and Brace System

USEFUL HINTS

1. A **Wire Tension Indicator** can be built by the following method. Take a piece of wood, 42 inches long, and place two nails 40 inches apart (nails 1 and 2). The third nail, in the centre, should be ½ inch below the centre line. Using a small spring scale, (while touching the wire with nails 1 and 2) pull the wire until it just touches nail 3. Read the scale and multiply by 20 to get the approximate wire tension. For example, if the scale reads 10 lbs, then the wire tension is approximately 200 lbs.



Wire Tension Indicator

2. Joining wires is done efficiently, and without significant loss in strength, with the **Figure 8 Knot** as shown below.

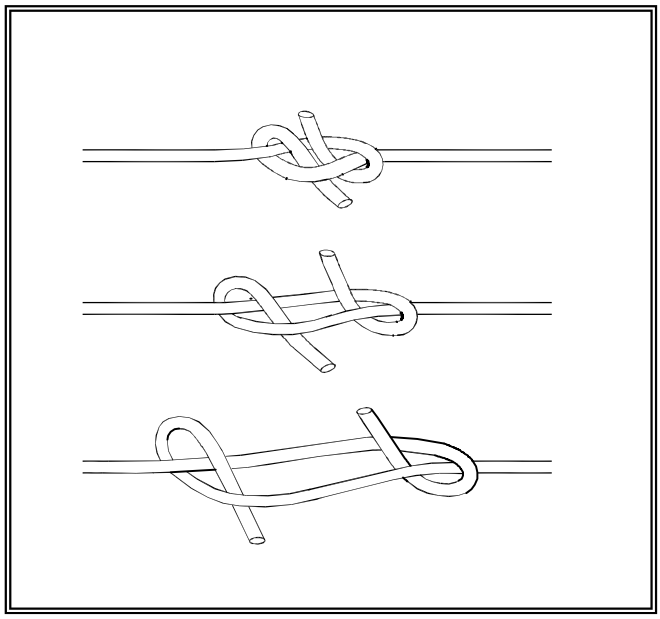
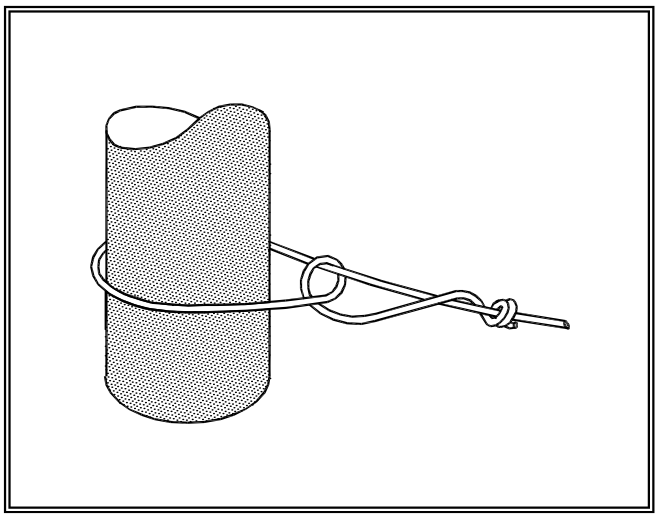


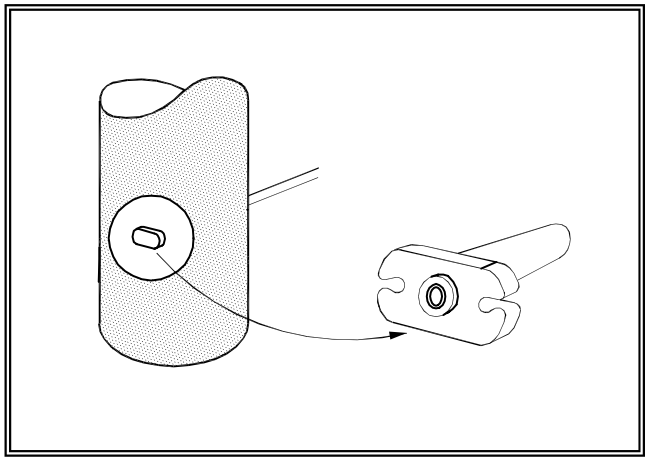
Figure 8 Knot

3. To tie wires off at posts, the following **Simple Knot** is effective without reducing wire strength significantly. This knot can also be used when tying wires off around other wires or cables.



Simple Knot

4. A **Wire Vise** installed in an end post allows for tensioning of wire. Simply pull the wire through the vise, tighten to specified tension, then release. The vise will grip the wire.



Wire Vise

Refer to BC Ministry of Agriculture, Food and Fisheries factsheet titled " Suppliers of Bird Control material and Equipment for BC Growers " .

FOR FURTHER INFORMATION CONTACT
Bert van Dalfsen, Mechanization Engineer
Phone: (604) 556-2109
Email: Bert.vanDalfsen@gems4.gov.bc.ca
Written by: Erich Schulz, A.Sc.T., Engineering Technologist
and Wayne Weber, Wildlife Damage Specialist

RESOURCE MANAGEMENT BRANCH
Ministry of Agriculture, Food and Fisheries
1767 Angus Campbell Road
Abbotsford, BC, CANADA V3G 2M3