Our 2004 South-Facing Lean-to Greenhouse...
helped heat our warehouse & our warehouse helped heat the greenhouse! (by using 2 fans.)

The greenhouse is 9 feet wide, 16 feet high, and 80 feet long. The smooth white-painted rafters are an average of just over 7 feet apart, which is OK because the snow slides off the steep angle and our woven poly is applied tightly to reduce flapping. We used 20' x 84' for the side and top and 10' x 16' for each end.

Our cinchstrap secures the poly to the rafters.

White stone has been added in front of the south side to reflect more light into the greenhouse.

We have raised beds inside and metal barrels filled with soil. The plants hang down the sides. There's tomatoes, cucumbers, peas, beans, grapes & other vines. See page 12 for Barrels.

In the north side of our greenhouse we have shelves with cement blocks and plastic milk, pop, and detergent bottles filled with water. These help moderate heat in the day and hold heat at night. Tomato plants grow in front of these shelves secured to rebar poles.

Northern Greenhouse Sales Inc.

Bob Davis, President / Margaret Smith-Davis, Vice-President

TEL 1-(204)-327-5540 (6am-6pm Central)
FAX 1-(204)-327-5527

Website: www.northerngreenhouse.com
Email: info@northerngreenhouse.com

Northern Greenhouse Sales Inc.
Box 42
Neche, ND 58265 USA

Northern Greenhouse Sales Inc.
Box 1450
Altona, MB R0G 0B0 Canada

Serving you since 1980!

OUR SUPERSTRONG WOVEN POLYS

***Easy Info Locator*: See back cover for page #s of prices, products, articles, photos!**

WOVEN POLY ADVANTAGES:

WOVEN POLY IS LOWER IN COST THAN GLASS OR FIBERGLASS & LIGHTER & EASIER TO INSTALL.

LIGHT PROPERTIES: Our 11 mils Superstrong "Clear" (translucent) Woven Poly gives 100% light diffusion, scattering and refracting the light, causing it to come from all directions, reducing shadows, eliminating spots of over-intense heat, and providing more uniform light, all of which reduces plant stress, making it ideal for growing stocky "non-leggy" plants. 11 mils Superstrong "Clear" (translucent) Woven Poly is best for plants.

LONGEVITY: See our conditional pro-rated warranty on page 6. Clear sunny skies are hard on poly. The UV inhibitors in our poly protect it, normally enabling it to last 3-4 years or more, even on the sunny south side of a properly ventilated structure. On well ventilated structures, especially in cloudy or shady areas, many get 7-10 years from our poly. The record is 18 years. Pages 6 & 11 outlines some keys to extending poly life.

STRENGTH: Our woven poly can be used in virtually any climate. It resists hailstones, gale-force winds, snow loading, cat and bird claws, and stones. The toughness is due to the weave, and thickness.

TEAR RESISTANCE: It's tough! Test it yourself! Puncture a hole into the middle of your sample and try to make the hole expand. You'll find it's very tough.

HEAT RESISTANCE: The dense weave of our poly helps to reduce hot weather stretching/sagging.

RESISTANCE TO COLD-CRACKING: Resilience down to minus 100 degrees F.

POLY SUMMARY: KINDS we sell & CHOOSING which one(s) you want

Our "CLEAR" (translucent) and "COLORED" woven polys: All are heavy gauge triple-layered high-density poly. All are attractive looking and strong. All can be installed with either side outwards. The "CLEAR" (translucent) poly's life is prolonged by UV Stabilizer and the "COLORED" poly's life is prolonged by the fact that UV rays cannot pass through it. All our woven poly seems to last virtually forever indoors if direct sunrays do not hit it.

11 mils Superstrong "Clear" (translucent) Woven Poly – This is our BEST poly for combined strength and light. It is made **especially for greenhouse use** and for other **uses where light transmission is important**. It's great for light-loving plants such as melons, tomatoes, peppers, and cucumbers. It is strong, resistant to hail, snow, wind, etc. This is the strength we've sold for almost 35 years. Can make larger custom sizes, see page 3.
- 10' and 12' Standard Widths, 24 sq. ft./pound. Mail: Canada or USA up to 1500 sq. ft. per box. UPS: USA up to 3400 sq.ft./box. Bigger pieces ship by truck.

12 mils BLACK/SILVER Woven poly – Black on one side, silver (flat medium gray) on the other. This is the most popular color and thickness for pondliners and miscellaneous yard covers as well as for our grommeted hemmed tarps. **MOST POPULAR USES:** This color and thickness is ideal for outdoor uses: Pondliners, tarps, covers for cars, grain, woodpiles, machinery, & tents; ground covers for tents & greenhouses; covers for barns & sheds; temporary shelters such as swap-meet booths or fishing shacks. Both black & silver stop penetration of UV radiation. UV breaks down poly, so blocking it gives you longer poly life. Our 12 mils Black/Silver outsells our heavier, costlier 24 mils Black/Silver. Can make larger custom sizes, see page 3.
- 12' Standard Width, 23 sq. ft./pound. Mail: Canada or USA up to 1400 sq. ft. per box. UPS: USA up to 3250 sq.ft./box. Bigger pieces ship by truck.

OUR 24 MILS WOVEN POLY: The following are made for uses such as boat-houses, storage buildings, pond liners, barn curtains, animal screens, etc. These polys are also used for making tarps with hems and brass grommets. Tarps are described on the price pages, in tarps section. Before ordering tarps phone for current pricing. Tarps take about 3-6 weeks more.

24 mils Superstrong "Clear" (translucent) Woven Poly – This poly is for heavy duty farm and yard structures, not for growing, except low light plants and trees. It has exceptional strength, durability, but less light admitted. Has UV stabilizer. Other Uses: Barn curtains, barn enclosures, inside "light walls" separating animals or rooms. Can make larger custom sizes of any poly.
- 12' Standard Width, 13 sq. ft./pound. Mail: Canada or USA 800 sq. ft. per box max, USA: UPS 1850 sq. ft./box

24 mils (12 ounce) **BLACK/BLACK (B/B) Woven Poly** – This is a much heavier, stronger version than 12 mils black/silver, above. Can make larger custom sizes. Tarp details on page 5.
- 12' Standard Width, 11-12 sq. ft./pound. Mail: Canada or USA up to 700 sq. ft./box. UPS: USA up to 1550 sq. ft./box

24 mils (12 ounce) **WHITE/WHITE (W/W) Woven Poly** – White on both sides. It can be used on or in a barn, house, or animal pen wall to reflect back whatever light is available. It lets through a slight amount of light if backlit. Can make larger custom sizes.
- 12' Standard Width, 11-12 sq.ft./pound. Mail: Canada or USA up to 700 sq. ft./box. UPS: USA up to 1550 sq. ft./box

24 mils (12 ounce) **Poly in SILVER/WHITE, GREEN/WHITE, BLUE/WHITE, RED/WHITE, BEIGE**
Can make larger custom sizes.
- 12' Standard Width, 11-12 sq.ft./pound. Mail: Canada or USA up to 700 sq. ft./box. UPS: USA up to 1550 sq. ft./box

WE CAN HELP YOU CALCULATE THE AMOUNT OF POLY YOU NEED...

If you'd like help, call us: Tel. 1-204-327-5540, email us at info@northerngreenhouse.com or Fax us at 1-204-327-5527.

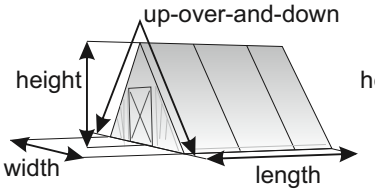
Be ready with ALL FOUR measurements (as described on page 3), your building sketch, the name of the diagram on Page 3 that looks most like your building, your phone number, address, and email address.

CALCULATING WHAT SIZE POLY TO BUY

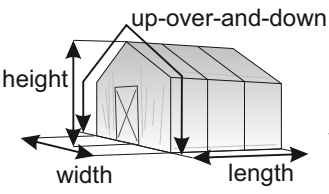
First, take FOUR Key Measurements: the length, width, and height of your structure, & a new one: the up-over-and-down measurement, this way:

Start from the ground, measure up the side wall and continue up over the roof to the top and down to the ground on the other side. This is important, because that's what the poly has to do. The poly has to go up over your building and down the other side, so we need this measurement to calculate the size of the poly you need.

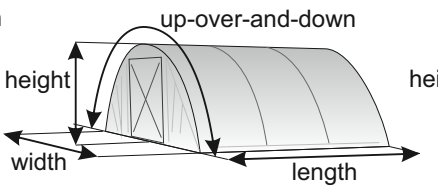
A-Frame:



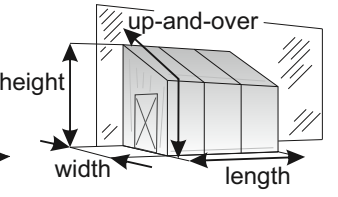
Peaked Roof:



Quonset:



Lean-to:



Then, Calculate Poly Size:
Add one foot in each direction on each piece, so that you have a bit extra to grab onto and pull tight when fastening.
Each end needs (Width +1ft) by (Height +1ft). Remember to **order 2 end pieces.**
The big main piece needs (Length + 1ft) by (Up-over-and-down + 1ft).

You can choose the Standard Width Size of 10 or 12 feet x Any Length (see page 2) or Any Custom Width over 12 feet x Any Length that is any combination of 10 & 12 foot segments (see below) you need, including the extra foot each way for fastening. If ordering custom sizes, remember to add extra for the seam allowance of two inches per seam.

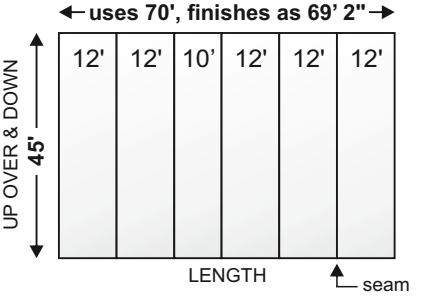
If you'd like help, call us: Tel. 1-204-327-5540, email us info@northerngreenhouse.com, or Fax 1-204-327-5527 with ALL FOUR measurements (see above)**, sketch, and your phone number and address.**

CUSTOM (WIDER) WIDTHS: We can custom-make ANY WIDTH wider than standard.

Generally, the **Length** of a custom piece is **standard Widths joined** side by side, but **each seam** will **use up two inches**. Call us if you need help. (See **IMPORTANT** Note below.)

How We Make Custom Sizes: See also below.

DIRECTION OF SEAMS: (See diagram.) **IMPORTANT: On ALL LARGE structures, ALL seams should run "up, over, and down,"** not sideways, (**not parallel to the ground**).
Each seam takes 2 inches to make, so a 45' x **70'** piece will have a finished size of 45' x 69' 2". See diagram at right.



Important Note on All Custom Sizes:

All custom sizes (except tarps) should have a **LENGTH** that is a multiple of the standard widths. For 11 mils Superstrong "Clear" (translucent) Woven Poly this would be a multiple of 10' or 12' or any combination of 10' and 12'. For 12 mils black/silver and white/white or 24 mils black, white or colour poly this would be a multiple of 12'. See also above. **IMPORTANT:** On **ALL LARGE** structures, **ALL seams should run "up, over, and down,"** not sideways, (**not parallel to the ground**). This is repeated because it is vital!

Our 11 mils Superstrong "Clear" (translucent) Woven Poly has 10' and 12' as its standard widths, so for custom pieces **order the Length as a multiple of 10'**, such as: **30'**x15' or **40'**x17' or **80'**x56' **or a multiple of 12'**, as below, **or a multiple of a combination of 10' and 12'**, such as **42'**x27' (made from 3 pieces **10'**x27' + 1 piece **12'**x27'), or such as **34'**x25' (made from 2 pieces **12'**x25' + 1 piece **10'**x25').

All our 24 mils woven poly (any available color) and 12 mils Black/Silver & White/White woven poly have 12' as their standard width, so for custom pieces **order the Length** as a multiple of 12', such as: **36'**x15' or **48'**x17' or **84'**x56'.

Prices: See Pages 4-5 *Ordering Information: See Pages 30-31*

 Northern Greenhouse Sales Inc., Tel: 1-204-327-5540, Fax: 1-204-327-5527, Email: info@northerngreenhouse.com

POLY PRICES PER SQUARE FOOT FOR STANDARD AND CUSTOM WIDTHS

11 mils Superstrong "Clear" (translucent) Woven Poly available in 10 and 12 foot widths and in any width wider than 12 ft. (see pg 3)
12 mils Superstrong Black/Silver Woven Poly available in 12 foot widths and in any width wider than 12 ft. (see pg 3)
For other materials, please contact us for current pricing

SEE WEBSITE FOR CURRENT PRICING

Size in sq.ft.				Price per sq.ft.		
100	sq.ft.	to	199 sq.ft.	$0.58	per sq.ft.	- Standard Widths and Custom Widths
200	sq.ft.	to	299 sq.ft.	$0.49	per sq.ft.	- Standard Widths and Custom Widths
300	sq.ft.	to	499 sq.ft.	$0.44	per sq.ft.	- Standard Widths and Custom Widths
500	sq.ft.	to	1999 sq.ft.	$0.39	per sq.ft.	- Standard Widths and Custom Widths
2000	sq.ft.	to	4999 sq.ft.	$0.37	per sq.ft.	- Standard Widths and Custom Widths
5000	sq.ft.	and	up	phone us		- Standard Widths and Custom Widths

> Measuring & Calculating Sizes - See page 3. Or ask us for help. (See top of page)

Precalculated Standard Width Poly Prices by Length and Width

10' Wide Poly - Prices for Various Lengths of 10' Wide Poly - 11 mils Clear

Length	ft x	Width	ft x	per sq.ft.	=	Price
10	ft x	10	ft x	$0.58	=	$ 58.00
15	ft x	10	ft x	$0.58	=	$ 87.00
20	ft x	10	ft x	$0.49	=	$ 98.00
25	ft x	10	ft x	$0.49	=	$ 122.50
30	ft x	10	ft x	$0.44	=	$ 132.00
35	ft x	10	ft x	$0.44	=	$ 154.00
40	ft x	10	ft x	$0.44	=	$ 176.00
45	ft x	10	ft x	$0.44	=	$ 198.00
50	ft x	10	ft x	$0.39	=	$ 195.00
55	ft x	10	ft x	$0.39	=	$ 214.50
60	ft x	10	ft x	$0.39	=	$ 234.00
65	ft x	10	ft x	$0.39	=	$ 253.50
70	ft x	10	ft x	$0.39	=	$ 273.00
75	ft x	10	ft x	$0.39	=	$ 292.50
80	ft x	10	ft x	$0.39	=	$ 312.00
90	ft x	10	ft x	$0.39	=	$ 351.00
100	ft x	10	ft x	$0.39	=	$ 390.00
110	ft x	10	ft x	$0.39	=	$ 429.00
120	ft x	10	ft x	$0.39	=	$ 468.00
130	ft x	10	ft x	$0.39	=	$ 507.00
140	ft x	10	ft x	$0.39	=	$ 546.00
150	ft x	10	ft x	$0.39	=	$ 585.00
160	ft x	10	ft x	$0.39	=	$ 624.00
170	ft x	10	ft x	$0.39	=	$ 663.00
180	ft x	10	ft x	$0.39	=	$ 702.00
190	ft x	10	ft x	$0.39	=	$ 741.00
200	ft x	10	ft x	$0.37	=	$ 740.00
225	ft x	10	ft x	$0.37	=	$ 832.50
250	ft x	10	ft x	$0.37	=	$ 925.00
275	ft x	10	ft x	$0.37	=	$ 1,017.50
300	ft x	10	ft x	$0.37	=	$ 1,110.00
325	ft x	10	ft x	$0.37	=	$ 1,202.50
350	ft x	10	ft x	$0.37	=	$ 1,295.00
375	ft x	10	ft x	$0.37	=	$ 1,387.50
400	ft x	10	ft x	$0.37	=	$ 1,480.00
450	ft x	10	ft x	$0.37	=	$ 1,665.00

12' Wide Poly - Prices for Various Lengths of 11 & 12 mils Clear, 12mils Black/Silver or White/White

Length	ft x	Width	ft x	per sq.ft.	=	Price
10	ft x	12	ft x	$0.58	=	$ 69.60
15	ft x	12	ft x	$0.58	=	$ 104.40
20	ft x	12	ft x	$0.49	=	$ 117.60
25	ft x	12	ft x	$0.44	=	$ 132.00
30	ft x	12	ft x	$0.44	=	$ 158.40
35	ft x	12	ft x	$0.44	=	$ 184.80
40	ft x	12	ft x	$0.44	=	$ 211.20
45	ft x	12	ft x	$0.39	=	$ 210.60
50	ft x	12	ft x	$0.39	=	$ 234.00
55	ft x	12	ft x	$0.39	=	$ 257.40
60	ft x	12	ft x	$0.39	=	$ 280.80
65	ft x	12	ft x	$0.39	=	$ 304.20
70	ft x	12	ft x	$0.39	=	$ 327.60
75	ft x	12	ft x	$0.39	=	$ 351.00
80	ft x	12	ft x	$0.39	=	$ 374.40
90	ft x	12	ft x	$0.39	=	$ 421.20
100	ft x	12	ft x	$0.39	=	$ 468.00
110	ft x	12	ft x	$0.39	=	$ 514.80
120	ft x	12	ft x	$0.39	=	$ 561.60
130	ft x	12	ft x	$0.39	=	$ 608.40
140	ft x	12	ft x	$0.39	=	$ 655.20
150	ft x	12	ft x	$0.39	=	$ 702.00
160	ft x	12	ft x	$0.39	=	$ 748.80
170	ft x	12	ft x	$0.37	=	$ 754.80
180	ft x	12	ft x	$0.37	=	$ 799.20
190	ft x	12	ft x	$0.37	=	$ 843.60
200	ft x	12	ft x	$0.37	=	$ 888.00
225	ft x	12	ft x	$0.37	=	$ 999.00
250	ft x	12	ft x	$0.37	=	$ 1,110.00
275	ft x	12	ft x	$0.37	=	$ 1,221.00
300	ft x	12	ft x	$0.37	=	$ 1,332.00
325	ft x	12	ft x	$0.37	=	$ 1,443.00
350	ft x	12	ft x	$0.37	=	$ 1,554.00
375	ft x	12	ft x	$0.37	=	$ 1,665.00
400	ft x	12	ft x	$0.37	=	$ 1,776.00
450	ft x	12	ft x	$0.37	=	$ 1,998.00

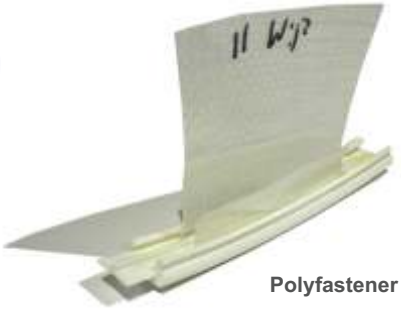
All prices subject to change without notice – see pages 30 and 31 to calculate shipping etc

PRICES - CINCHSTRAP, POLYFASTENER, TOOLS, SCRAPS

Description	Size	Price	Comments
Cinchstrap	100' roll	$24.00	convenient, economical, flexible plastic lath - see pages 8 to 9
Polyfastener – PR800	per ft.	$2.00	partial boxes of polyfastener, available by the foot
Polyfastener – PR800	100' roll	$135.00	2-part track and channel system for frequent poly changes – p. 7, 9
Polyfastener – PR800	300' roll	$275.00	2-part track and channel system for frequent poly changes – p. 7, 9
Polyfastener – PR900	250' roll	$315.00	PR 900 is an extra-wide polyfastener for up to 24mils poly, e.g. for joining 2 layers of 12 mils poly – p. 7, 9
PF Tool – Heavy Duty	1 HD Roller	$36.00	Heavy duty Zip Roller tool with internal metal shaft. Good when installing large amounts, or when the weather is a little cool. Comes with a plastic Unzip Hook to remove the polyfastener. – p. 7, 9
Poly Scraps	as is or joined together	22¢	Prices per sq.ft. Misc scrap pieces in "clear" translucent or black/silver. Please indicate minimum sizes required.

Cinchstrap

Heavy Duty PF Tool



Polyfastener

Prices for Custom-Made Woven Poly Tarps with hems and brass grommets

(brass grommets every 2 feet around the perimeter, reinforced hems, strengthened with rope edging)

12 mils (6 oz) woven poly tarps available in Translucent or Black/Silver
24mils (12 oz) woven poly tarps available in Translucent, Black/Black, White/White, White/Green, White/Blue, White/Red, Beige. Colors not quite as shown.

Color Samples

Prices - Please phone us for current pricing on tarps. They change often due to the many components.

Description – Extra strong woven poly. They're water-proof, mildew-resistant, rot-proof, and do not shrink. They're strong, tear-resistant, and store easily. Choose 12 mils for easier handling or 24 mils for greater strength. Phone to discuss which one best suits your needs.

Color and thickness choices as above. Black/black or black/silver tarps last longer in the sun than clear tarps.

Tarp Sizes – Our woven poly tarps are custom made to the size you need (almost any size). Phone us to discuss the size and kind you'd like. If you need something specialized, please send a sketch.

Sample - There's a sample of the 12 mils black/silver poly in our catalog. If you need a sample of the 24 mils before ordering, please phone or write and state the intended use of your tarp.

Custom Size Woven Poly Barn Curtains and Custom Size Woven Poly Panels

Colors and thickness choices same as tarps. Prices usually less than tarps. Often quicker to make and ship.

IMPORTANT INFORMATION

Pro-rated Conditional Warranty On Normal Wear & Tear - see page 6
Proper Venting, Painting, and Fastening Techniques (Ways not to void your Warranty) - see p 6 & 11

All prices subject to change without notice – see pages 30 and 31 to calculate shipping etc

DO THIS TO PROLONG YOUR POLY LIFE:

VENT THE HEAT! ALWAYS!! The top of my lean-to greenhouse easily reaches 160 degrees if not vented. Excessive heat will cut your poly life, and your plants. On a hot, clear, windless day, opening your door is NOT enough. You need OVERHEAD vents (heat rises) and LOWER vents to let in cold air. Whereas commercial operators always heavily ventilate (mainly by fans) novices continually underestimate the damage poly and plants suffer due to heat. A plant can be under heat stress before it wilts. I can give you more details on venting and fans on my fan sheet, available on request. (Please send a stamped, self-addressed envelope if possible. Thanks!).

PAINT THE RAFTERS WHITE: White is the best. It will reflect the heat keeping the poly cooler thus prolonging its life. White also reflects light into the greenhouse. NEVER use black, brown, or colored paint on any wood or metal if it contacts the poly. Paint it white--only white! Please! White paint reflects heat and light so that poly is cooler and the greenhouse is brighter for all those sun-loving plants you are growing.

RAFTER ANGLES: For snow to slide off by itself 65-70 degrees up from horizontal is the MINIMUM angle. Also, in winter 65-70 degrees is close to the ideal angle to catch the maximum amount of sun in southern Canada and the northern States. The "Brace" design is ideal for this. See "Information Sources" on page 22 for their address. (Operators of large commercial greenhouse don't worry so much about the "correct" angle due to the large area and the use of artificial heating). By the way, if you use steep angled rafters, they can be longer, farther apart, because snow loading will be less. (Snow slides off better from steep roofs.) But brace them to prevent movement.

RAFTER SPACING & BRACING: If you get hurricane winds you may want 2 foot spacing on a straight wooden rafter greenhouse though lighting will be reduced a bit. In average wind areas woven poly has been used successfully on rafters 6 feet apart. I get strong winds and use 8 foot spacing, but I use steep rafter angles and I cross-brace. Cross-brace all long rafters to prevent vibration and movement of rafters in strong winds.

See Cherie's beautiful pond and waterfall in the customer gallery on our website!
www.northerngreenhouse.com

REDUCE ABRASION: Abrasion always occurs as poly rubs back & forth over the rafters due to winds. Our woven poly is more resistant to abrasion than regular poly due to its thickness, high-density weave & resistance to expansion and contraction. However, it will last longer if you wrap the rafters & braces with poly. (You can also purchase our cinchstrap or sand the rafters smooth to eliminate splinters and sharp corners and paint with white paint.)

INSTALL TIGHTLY AS A DRUM: Although woven poly's weave is resistant to thermal expansion due to the dense weave it still expands a little when hot. So if at all possible install on a warmer day, it will then tighten more when it cools, thus resisting destructive flapping. If you use our Polyfastener then the poly can be removed at any time, re-tightened, and then re-inserted. However if you install tightly the first time you will not have to re-tighten. The more hands the better, especially on a cold day. Invite over all your friends and enemies and serve them some pizza and chili! Remember, if it's as tight as a drum it will resist extremely strong winds. Pick a calm day if possible. I've found it best to install one high corner first, then go to the other high corner and pull tight, then fasten all along the top, then proceed to one of the lower corners, pull tight and fasten, then go to the other lower corner and pull like mad. Then fasten along the bottom while pulling. Pull hard! See pages 7 & 11

REMOVE THE COVER: (optional) Some, especially in the south, remove the poly part of the year. Keep poly on the greenhouse if the night temperatures drop below 70° F. if you want optimal plant growth.

Conditional Pro-rated Warranty On Normal Wear & Tear

We offer a conditional pro-rated 3 year warranty, on normal wear & tear, provided that you installed your poly tightly (without flapping or sagging), on white or silver, smooth rafters, that you have vent fans &/or big ventilation doors at each end and also along the sides or top in a longer greenhouse to reduce excessive heat. Please send us a photo showing the damaged poly on the greenhouse. Please also send us a sample of the damaged poly. The way our pro-rated warranty works is that we give you either a credit or a refund for the remaining proportion of the 36 months based on the price paid on the poly itself. For example, if your poly cost you $300 and it lasted 2 years (24 months) from the invoice date, then you would get a credit or a refund for 12/36 x $300 = $100. We do not give any warranty refunds for produce lost, labor, shipping or other problems or costs. If you have the unusual misfortune to have your properly installed poly fail and you've done all you can to prevent it, contact us and we'll credit you when your photo & sample come. We do not cover replacement due to damage from high winds, earth quakes, hail over 1/2" in size, trees or branches, vandalism, fire, theft, etc.

Woven Poly Samples
11 mils Translucent & 12 mils Black/Silver

STAPLE POLY SAMPLES HERE

3 WAYS TO FASTEN POLY TO THE RAFTER:

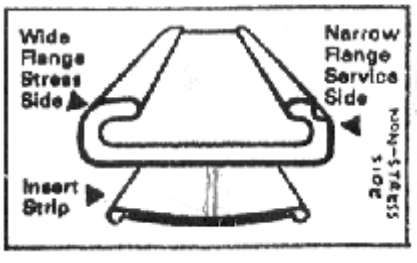
Poly must never be attached with bare staples or nails. Some sort of strip must be used to spread the stress of the attachment point. Here are three appropriate choices.

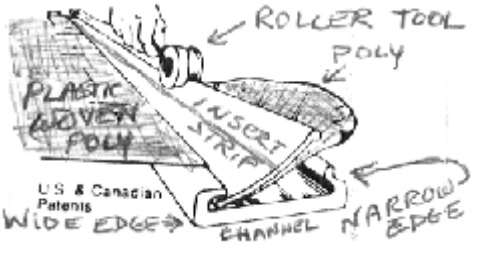
1. CINCHSTRAP: If you want something smoother & more attractive than wooden lath, try our cinchstrap. Cinchstrap is plastic lath: an attractive white high-density ultraviolet stabilized polyethylene strip. The white reflects heat, keeping the poly on the rafter's cooler. Being smooth it does not abrade the poly in strong winds. It bends easily around curves & corners, unlike wood lath. It's flexible, tough & durable. But it can be cut with sharp scissors. It's almost 2" wide. It's simple & fast to apply. It can also be nailed down on each stud so that the poly rests on the smooth surface of the strap. This helps prevent abrasion. For details see pages 5, 8, 9. This is cheaper and easier to install than my Polyfastener.

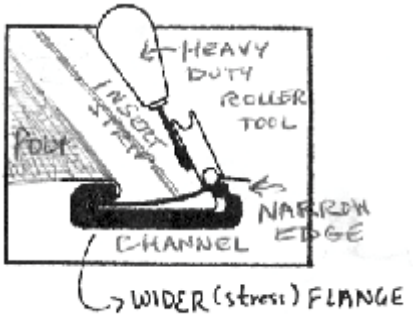
2. POLYFASTENER: Polyfastener is a smooth white 2-piece system for clamping the poly to the frame without making holes in the poly. It is used on the outside/perimeter rafters and base. It is used on large steel-arched greenhouses. With Polyfastener poly can be installed on a cold day, and when it gets hot you can easily remove the insert strip in the Polyfastener and re-tighten the poly. This can be done repeatedly without any puncturing of the poly, since it is clamped rather than nailed. See pages 5, 7, 9, 10.

3. WOODEN LATH: Wood lath is harder on poly. These are strips of wood perhaps 1/4" thick by 1 1/2" wide. Sometimes you can get lath free from lumberyards where it's often used as spacers between lumber, some of my customers do that. Sand them smooth to lessen abrasion & lengthen poly life. Or use white carpet. Poly disintegrates first beneath the wooden lath. If you wish to reduce abrasion, you can insert a layer of poly on the rafter & also between the woven poly & lath. The smoother & whiter the surface, the better it is for the poly, so sand & paint if using wood.

POLYFASTENER - A CHANNEL & INSERT STRIP SYSTEM TO ATTACH POLY IN A READILY REMOVABLE WAY







POLYFASTENER is a **two-part** smooth, hard plastic channel and insert strip that tightly locks poly to the greenhouse frame. The insert strip is sent with channel.

If you need to be able to **take your poly on and off** at certain seasons of the year, POLYFASTENER may suit you better than cinchstrap or lath. The roller tool and hook tool allow you to attach and remove and reattach the poly with relative ease.

I recommend POLYFASTENER if you are securing any large expanse of poly which will be attached only around the perimeter (such as a Quonset). With no direct contact with nails or screws the poly will not tear at the contact point along the POLYFASTENER. Use our cheaper cinchstrap on small greenhouses or if nailing down the poly on every rafter. **PRICES SEE PAGE 5.**

SIZES: By far the most popular is the 800 gauge, 1 1/8 inches wide, used for 6 to 12 mils poly and also for joining 2 pieces of woven poly together (see page 10 “Portable Reusable Seam”).

INSERT STRIP is available separately if required but it automatically comes with the POLYFASTENER

Polyfastener article continues on page 9

STAPLE CINCHSTRAP HERE

HERE'S A SAMPLE OF OUR PLASTIC LATH --
C I N C H S T R A P
(pronounced "sinch-strap") PRICE on page 5
"So easy to apply it's a cinch!"

CINCHSTRAP: A PLASTIC LATH TO NAIL DOWN THE POLY.

DESCRIPTION: CINCHSTRAP is flexible but tough and durable flat plastic lath. It has a clean white color. It is 1 3/8" wide and is made of high-density poly, exactly the same material used in our Polyfastener, but thinner.

FEATURES of CINCHSTRAP:
1. Cinchstrap is easy to cut to length and to nail on (see Installation, below).
2. Cinchstrap is very smooth, almost slippery, so it will not harm the poly in high winds.
3. Cinchstrap is very flexible, and easily bends around curves and corners.
4. Cinchstrap looks attractive. The bright white color is built right in and won't peel off.
5. Cinchstrap reflects the heat because it is white. This prevents heat build-up next to the poly.

HOW MUCH CINCHSTRAP TO ORDER for attaching the poly to a greenhouse: Measure the distance up-over-and-down the outside of your greenhouse. See page 3. Count how many times you need to do that distance, and multiply. That will tell you how many feet you'll need for studs and rafters. Then calculate and add on the length you'll need for nailing the poly to the bottom edges and to the cross bracing. **PRICE: see page 5**

INSTALLATION OF CINCHSTRAP - Cut off desired length, using a Stanley knife or sharp scissors, nail down one end, pull it as tight as possible until it stretches a bit, then nail down the other end, and then nail in between. Pulling it tightly prevents stretching in hot weather. If, like us, you get **high winds** and buffeting, then use **long large-headed roofing nails** to prevent the CINCHSTRAP from tearing out at the nail points.

HOW TO RE-USE CINCHSTRAP - If your winds are not high, and you want the CINCHSTRAP nailed down for only a short time, and if you want to re-use it again, just nail every few inches with very small headed nails such as finishing nails. Later you'll be able to pull it out (using a strong quick jerk) with no damage except for the small nail holes. The CINCHSTRAP is broad enough to re-nail.

SOME USES OF CINCHSTRAP:

1. USE CINCHSTRAP AS A LATH SECURING POLY TO RAFTERS, STUDS, or PERIMETERS
Many prefer CINCHSTRAP instead of wooden lath. CINCHSTRAP looks better, does not need painting and is easy to cut with scissors (I don't like sawing wood lath, I would rather have fun mulching my garden).

2. USE CINCHSTRAP AS AN ABRASION REDUCER BENEATH THE POLY
If the poly flaps in the wind and rubs against rough unsanded wooden studs or rafters accelerated weathering of the poly occurs. So sand those rafters. Some people nail CINCHSTRAP onto the rafters, instead of or in addition to sanding. The smooth CINCHSTRAP reduces abrasion. Some commercial greenhouse owners use strips of our woven poly instead, as batten tape beneath the main poly cover. That's great! You can make your own out of our woven poly, but CINCHSTRAP lasts longer. If CINCHSTRAP is employed for both uses #1 & #2, then the poly is protected on both sides like a slice of cheese between two slices of bread. (But without the mustard!)

3. USE CINCHSTRAP AS A TENSION STRAP TO REDUCE FLAPPING
It is recommended to stretch some form of strap over the arches of greenhouses if the poly is attached only along the perimeter but not nailed to the rafters. (e.g. on Quonset greenhouses if you have strong winds) Otherwise, the poly may flap in strong winds. Our CINCHSTRAP can be installed about every eight feet or so along the length to control flapping. CINCHSTRAP will dampen or baffle the flutter. This reduces danger of the poly tearing while flapping and reduces stress on the poly around the perimeter. It's an extra safety precaution during high winds, much like securing a truck tarp to control flapping. This may not work in hurricane force winds! CINCHSTRAP gets nailed securely down at one end, then thrown over the top across the width of greenhouse and nailed down securely at the other side. When installing, stretch and pull it tightly like a gigantic rubber band. Use LARGE-headed long shingle nails. CINCHSTRAP is smooth against the poly, attractive, strong, tough, flexible and easy to work with. **(More on page 9)**

SOME USES OF CINCHSTRAP: (continued from page 8)

4. USE CINCHSTRAP FRAMES FOR "INSTANT" REPAIRS & PRIVACY WINDOWS!
When the glass breaks in our shed or outbuilding windows I simply quickly re-cover with woven poly. I get tired of finding and cutting strips of wood to tack the poly to the frame and anyway I don't like the bother of painting each strip. So one day I tried using CINCHSTRAP and boy did it go fast! It took me just a few minutes! And it looked neat with its bright white profile. Just snip each piece with sharp scissors and tack down with shingle nails or smaller. I did some quick storm windows (our woven poly) on the house with it too. Woven poly is great on windows where you want privacy, like the bathroom, since you're not in there to look outside anyway! That extra layer of woven poly on the outside cuts heat loss & frost on the inside of the window.

5. USE CINCHSTRAP TO ATTACH "TEMPORARY" POLY WINDOWS
If you use small-headed or finishing nails to hold down the CINCHSTRAP then in spring you can just give a strong yank and the CINCHSTRAP will pull away with a snap. The strap can be reused if you are careful taking it off.

6. USE CINCHSTRAP WOVEN AS A PRIVACY SCREEN OR WINDSCREEN IN FENCING
CINCHSTRAP can be woven in and out of a chain link fence, blocking the wind and providing privacy.

7. OTHER USES There are many other uses for CINCHSTRAP.
Let me know what you come up with that's new. Here are some of my other uses. CINCHSTRAP is handy for securing plastic to plant benches and I used it to hold down the woven poly to the ceiling and four walls inside my chicken shed. (This keeps my shed airtight and warmer and protects the insulation from the water vapor given off from the chickens.)

CHOOSING Between POLYFASTENER and CINCHSTRAP

Choose POLYFASTENER for places where you want to open & re-close the poly. Generally used on perimeters only. The sheet of poly must come out the wide-lip side. If used as a seam, be sure both pieces of poly come out the wide-lip side. (One piece then crosses over the polyfastener to go back to the direction you want.)

Choose CINCHSTRAP for places where you want to nail poly on and leave it there until replacement time or for a clean white inexpensive sliver-free lath for any project large or small. Most smaller greenhouses use cinchstrap.

ADVANTAGES OF POLYFASTENER: (continued from page 7)

HEAVY DUTY PF ROLLER TOOL: (Price Page 5). This tool is used to snuggle the insert strip into the channel, which has to fit tightly and snugly. It is helpful in cool weather and/or large installation jobs.

POLYFASTENER SAMPLES: Free sample of "POLYFASTENER holding a piece of poly" sent on request. If you want a sample of POLYFASTENER showing it "joining 2 pieces of poly together", ask specifically for that.
Illustrated instruction sheet also available if requested. Please send three stamps or a dollar for the postage.

EASY APPLICATION: Simple and fast. Please be sure to look for and follow the illustrated instructions that we will enclose with your order. It is important to stretch the POLYFASTENER as you are applying it to the building for the first time. Secure by wood screws or nails, staples, pop rivets, or double-sided self-adhesive foam tape for inside use with smaller gauges.

TIGHT SEAL: Stops drafts & costly heat losses, virtually eliminates water leakage.

LESS ABRASION=LONGER POLY LIFE: The smoothness and round corners reduce abrasion. This helps prevent the tears that can happen when wind rubs the poly against ordinary wooden lath.

IDEAL ON CURVED RAFTERS AND FRAMES: It bends easily as it follows the contour.

FLEXIBLE FASTENER = LONGER POLY LIFE: POLYFASTENER absorbs and cushions the quick, strong lateral motion of poly flexing in high windstorms. Stretching minutely, it reduces tears and cracking. The stress is evenly distributed along the entire length of the channel, NOT concentrated at one point.

SAVES ON TIME & LATH COST: Operators of large greenhouses usually use POLYFASTENER ONLY around the perimeter rafters. Why? If the poly becomes loose it can be re-tightened with absolutely no damage. You can just unzip and re-tighten and re-lock it with POLYFASTENER.

ATTRACTIVENESS: The clean, white, smooth surface is pleasing, eliminating the need for painting lath.

Polyfastener article continues on page 10

ADVANTAGES OF POLYFASTENER: (continued from page 9)

POLY CAN BE APPLIED IN HASTE: (AND LATER RE-TIGHTENED): I mean "haste" in two ways. POLYFASTENER is fast to use. But also you can apply poly in haste, even sloppily, too loose, rushing to beat a snowstorm (which always seems to happen to me). However with POLYFASTENER, no problem. Wait until the first warmer day comes along, unzip the poly, tighten it, and re-lock again.

INFLATED STRUCTURES: Being airtight, it's ideal to secure doubled poly layers in inflated greenhouses.

PORTABLE REUSABLE SEAM: What you get is a reusable fastener. A sewn seam only lasts as long as the poly. POLYFASTENER can be used over and over, even be moved around to other structures. If your fabric tears, take it down, salvage the good, and make the size you want by using POLYFASTENER to "sew" or join two pieces of poly together. There's no waiting for someone else to sew you a new piece. Be sure both pieces of poly come out the wide-lip side. This is vital!

GARDEN & FARM USES OF POLYFASTENER: Greenhouses, ventilating tubes, cold & hot frames, machinery covers, cow, sheep, and chicken enclosures, bee shelters, lagoon & pond liners, irrigation tubes, evaporation control covers on swimming pools, ponds, dugouts, water gardens and fishponds.

INDUSTRY USES OF POLYFASTENER: Construction protection (hoarding), truck box covers, winter enclosures.

HOME USES OF POLYFASTENER: "Walls" of light for garages, workshops; storm windows, screen doors, solar panels/collectors, privacy panels/dividers, verandas, waterbeds, tents, windbreaks, boat covers, needlepoint frames.

INSTALLATION: Secure the channel (by screws, nails, staples or pop rivets) lay the poly over it, snap in the insert strip with a POLYFASTENER roller tool. The film won't move, but can be easily removed without damage for re-positioning. (The POLYFASTENER hook tool is used to "unzip.")

POND LINERS - see page 2 for Black/silver poly in 12 mils and Black/black poly in 24 mils.

This client's **fish-ponds** (top of pg 28) **are lined with our 12 mils black/silver poly** (pages 2-3).

In this photo he's using our **Regular POLYFASTENER Roller Tool** to zip up our **POLYFASTENER** (p.5,7,9,10), thus installing our **Superstrong "Clear" (Translucent) Woven Poly** (p.2-5) as his **Fish ponds' winter cover**.

See Cherie's lovely poly pool & waterfall on page 6.
See more pics in the customer gallery on our website!

POLY MULCHING is increasingly practiced by professional growers and home gardeners. It often gives earlier, easier, cleaner, bigger crops due to warmer soil, reduced water loss, less compaction, less competition from weeds, and less hoeing and cultivating (which can damage crop roots by accident). It also saves time. I've laid our black woven poly onto perennial thistles and bindweeds, stopping the light and thus killing them easily and conveniently without a lot of effort.

"Clear" (translucent) woven poly, by actual tests, warms the soil better than the colored, as it allows the sun's rays to penetrate the soil. It may, however, let some weeds survive unless you first kill the weeds with opaque poly or else block out the light for as long as necessary by putting mulch: cardboardbark, grass clippings or opaque poly on top of the clear until the weeds are dead.

Our woven polys (translucent, white, silver, and black) are far stronger than the cheaper, thinner, non-woven types. Our woven polys therefore better stand up to foot traffic & wheelbarrow tires, trucks, they resist tearing & cracking & keep those pesky weeds from sneaking through. They last for years. See "Black Poly Paralyzes …. Weeds…"

GOOD POLY KINDS & PRICES: If you want **good poly for mulching: Pages 2-5.**

SCRAP PRICES & AVAILABILITY: Scrap or damaged poly for mulching: Phone Bob to discuss availability. Sometimes we have odd sized trimmings that we can sell. Let us know what sizes of scrap you hope for. We can send sizes as is or we can even heatseam them into a bigger pieces.

ABOUT US and OUR POLY FOR YOU!

Bob & Margaret Davis

Dear friends and customers……. Because of a desire for a simpler more affordable rural lifestyle, and for a great place for children to grow and thrive, we, Bob and Margaret Davis, moved here in 1977 from the busy Vancouver area of BC and bought a peaceful, fertile little farmyard on the prairies. Here God blessed us with three children, now adults! It's wonderful to see them on a regular basis and enjoy the growth in their lives. In 2008 we celebrated our 36th wedding anniversary and the birth of our first grandchild! Bob has planted thousands of trees and flowers for us and others to enjoy. Our own parents, now in heaven, were decent hardworking practical folks, with an interest in others and a curiosity about the world around us, and with dreams and tenacity to keep on trying. God and our parents each gave us gifts and longings that led us to where we are today. As a child, Bob learned from his father to love gardening and from his mother to love design. Margaret's mother taught her to love God and people and to be kind to others and to learn accounting. Margaret's father, who grew up on the prairies, seeing big skies, taught her to love the grandeur and soak in the peace and to be responsible and creative. Here we are surrounded by God's beautiful creation for miles in every direction, including up! The prairie has some of the biggest grandest skies both by day and by night. The heavens God's glory do declare! We have sunshine, beautiful sunshine most days of the year, and the joys of four seasons! Each season has its own colors and beauty. Some of the most moving scenes feature frost!

It was those frosts that got us into using greenhouses. Frost looks pretty! Yet it wrecks plants. Late frosts in the spring and early frosts in the fall were cutting our growing season way too short. So we built a greenhouse. On our first prairie greenhouse Bob originally tried 6 mil poly, which yellowed, shattered, shredded, and disintegrated in a matter of months in our severe climate. So we searched for something better and finally found it. Eureka! We knew others would like it too! After testing woven poly ourselves, we combined our mutual work and life experiences with the enjoyment of helping fellow gardeners, and have been selling our UV-stabilized Superstrong Woven Poly since early 1980. As our business grew, we modified our poly to add more UV stabilizer and thicker coatings. If properly installed and vented, our Superstrong Woven Poly stands up to years of violent winds, hail, & outdoor temperatures. The translucence of our poly prevents leaf burn. The diffusion of light by the weave promotes uniform growth. It's so tough even our cats can't tear it.

We're located in the center of North America, which is ideal for shipping. We are almost on the Canada-USA border, 3½ miles south of Altona, Manitoba, Canada & 4½ miles north of Neche, North Dakota, USA. We're about 15 miles west of the Red River, which flows through Winnipeg, Canada, and borders North Dakota & Minnesota. Winnipeg has the coldest average temperature of any large city in the world, even colder than Moscow in Russia. The soil is frozen solid for 6 feet straight down by April. We have no Chinooks to warm us here! The average night temperature in March is about 13 degrees F. and the average day temp. is 28 degrees F. so we need greenhouses! This is farm country. The land is absolutely flat, the soil is rich, black and deep, and there is not a stone or rock in it for twenty miles around. The air is clean and dry, and we get over 6 hrs. of bright sunshine a day on average. We love it!

It's our goal to see small and large greenhouses sprout up like mushrooms in our two sister nations. We are also interested in promoting family gardens and affordable solar heating and wind power. We live inexpensively in an older house, growing much of our own food and reusing and recycling wherever possible. We are involved in mentoring area teens, giving them emotional and spiritual support. When possible, we hire teens to staple samples into the catalogs, tape the boxed orders, maintain the business yard, or even learn heatsealing and order processing. Seeing them grow in confidence and skills is exciting!. This catalog is our message to you, our customers and friends. In this computerized world we hope you don't mind us blending "personality" and "folksy" hints into our catalog along with the needed stats and specs.

We look forward to hearing from you. Thanks again for your support. And thanks for telling your friends and neighbors about us. Word of mouth advertising by people who like our product has helped us to keep prices down through the years. Feel free to write to us anytime about your questions, ideas and hints. Send pictures, please! Keep smiling & God bless you! ☺☺ Bob & Margaret

Tel. 1-204-327-5540, Fax 1-204-327-5527, Email: info@northerngreenhouse.com, mailing info: see front / back covers.

HOW TO ATTACH POLY TO THE ENDS & SIDES OF A METAL FRAME (Also See P 6-10)

Perhaps the most common question asked of us is how to attach the poly to the ends and sides of a metal greenhouse, whether the frame is metal tubing or rebar. With a wooden frame you can attach the poly with nails or screws and our flexible cinchstrap or polyfastener, or with wooden lath. You can't nail onto metal. But you can attach wood to the metal, and then attach the poly to the wood!

How to attach wood to the metal: Clasps or clamps can be purchased to go around the pipe or rebar and into the wood. To save some money on clamps, I use some long nails and partly drive the nails into the wood and then tightly curl them by hammering around the metal pipe or rebar. Attaching wood to the metal at the two ends of the structure makes a permanent framework for fastening the poly to the ends.

Attach wood along the long sides: Using the method described above, attach boards (outside of the frame), along the lower edges of the long sides of the greenhouse. This will give you a place to nail down the bottom edges of the long sides of the main piece of poly covering. But don't put on any poly yet!

Attach wood around the metal curve at each end: To fasten poly to the ends of metal structures, I buy or find short pieces of wood, usually 2 or 3 feet long. I prefer two by fours. I attach the wood within the space formed by the curve of the metal, to follow the curve and to create something into which I can later drive nails to hold the poly.

Attach wood along the ground at each end: Along the ground at each end I attach a preserved wood sill plate. Attach it to the ground by drilling holes in it every few feet and driving pieces of rebar rod into the ground to hold it down. Attach it to the metal frame by using u-shaped staples, clamps, or bent over nails, as above.

Make vertical studs at each end: Secure wooden vertical studs to the ground plate and to the wood framework that follows the curve of the metal frame, as above. This wood at each end makes a permanent framework for building doors and vents at each end.

Make doors and vents at each end: I build the poly doors and poly vents framework out of wood and cover them with poly. Build lots of vents please! Vents are good for your plants and also for your poly life. Neither plants nor poly like to get overheated to where they cook or wilt. I attach the poly using my cinchstrap as a lath between the poly and the nail-head.

Cover the structure with woven poly covers: The sides and top can be covered with one big piece and the two ends can be covered with separate pieces of poly. Or, you can instead use one big piece of poly to cover the whole length and the ends in one go, which I find works well on a small greenhouse. **Either way, fasten the poly to the wood you've attached as above.**

BOB'S RAISED GROWING BEDS - FOR BUMPER CROPS WITH EASE !!!

I will never go back to growing heat-loving plants at ground level. I'm hooked on raised growing beds!

Raised bed veggie growing (now mainly in the greenhouse) is a passion for me for about a dozen reasons: less weeding, less compaction, more production, earlier crops, and healthier, later crops, more aeration, warmer roots for faster growth, ease of access, ease in harvesting, cleaner crops, less danger of root rot, and more.

These ideas are my personal experiences. Please check into safety yourself before trying them.

Now I have BARRELS OF FUN !

The lean-to greenhouse on the south side of our warehouse (see pic on front cover) is filled with barrels of tomatoes, grapes and more! Our 50 gallon or so barrels cost us only $3 each from a company who makes fiberglass tombstones! The fiberglass is drained from these barrels leaving the sides coated with a thin layer, which helps prevent rust. Some people choose to burn out the fiberglass. The top and bottom are cut out so that the roots can penetrate the whole greenhouse. The barrels are several inches apart to allow air circulation thus warming up faster. Plants at the top of the barrel cascade down the sides making it easy to pick the lush tomatoes, cucumbers, squash, melons and other crops. The plants are also tied to rebar rods thus quickly producing a jungle of foliage all around the pathway, with cantaloupe bumping your head. All that heat and humidity causes the plants to grow like monsters.

WHY DO MY PLANTS GROW SO FAST?

I play them Tchaikovsky!! There are several other reasons. Moisture is optimal due to the high humidity and mulching. SOIL TEMPERATURE is a factor as well. That's one reason plants grow so slow in early spring, even if the air is quite warm, especially "warm" crops like tomatoes, melons and cukes. The temperature of soil in metal barrels climbs rapidly in the warm greenhouse, since the soil is way up in the air three feet high, where the warm air accumulates. (Cool air sinks to ground level.) Also, there is a very high ratio of soil exposed to the warm air through the metal compared to the same amount of soil on the ground. Several times more soil is warmed by the air than if it was at ground level, so the roots grow fast even at night. The soil will be warmer than the air at night. The greenhouse air, in turn, is warmer than the outside air.

MORE ADVANTAGES of METAL BARRELS

The plants are easily looked after, being at chest height. There is greater production. The plants cascade down the sides like a waterfall of fruit. Constant pruning is needed to prevent the path from being invaded by these fast-growing plants. The tons of soil in the metal barrels quickly absorb a tremendous amount of heat and release it at night. Wet soil holds almost as much heat as water. This is a good alternative to using valuable greenhouse space for water containers just to hold heat. You can have your cake and eat it too! The metal absorbs heat very fast. With soil barrels and a water-filled pathway I've found my plants won't freeze until it's below 20 degrees F. outside, even under just one layer of poly. Also, barrels are so much easier than building 3-foot high wooden containers, which will rot if not treated. Used barrels cost less than wood, are strong, and can be spaced to allow warm air between the barrels. And metal really absorbs heat. I paint some white to increase light. Black markedly decreases the light and may not be needed to absorb heat since there is so much thermal mass already there. If you want you can paint them red and blue, which will absorb heat and also provide the plants with most of the spectrum that they need. I have these in most of my greenhouses now.

PLAYING WITH (CONCRETE) BLOCKS

Our new A-Frame has a concrete block poly pool and raised concrete block growing beds. Inside one green house I constructed in the past, I built 5' high raised beds out of hundreds of concrete blocks stacked two deep without cement or mortar. I scrounged my blocks for free from houses and buildings being demolished. People are often happy to let you have them just for hauling them away. I have filled my raised beds with old manure and soil and mulched them heavily. Tomatoes and cukes hang down the walls for easy picking.

A REAL TANK GARDEN?

I drove to my neighbor's scrap yard, selected and bought six used 1000 gallon metal water tanks, each 14 feet long and 5 feet in diameter. I had him cut each tank into two 7-foot long cylinders and cut out the ends. That gave me twelve strong metal cylinders, each 7' high and 5' in diameter. We manhandled each into my pickup truck (one per load!) and I hauled them home. I erected each of them vertically about four feet apart inside my greenhouse. Then even more work! We filled each 7' high x 5' diameter cylinder with good soil and compost, by hand, using buckets, shovels, muscles, and ladders!

ADVANTAGES OF METAL CONTAINERS

Steel walls are so much thinner than concrete blocks, allowing more soil in the bed, they store heat at night, faster heat transfer from sun and air into the soil, more vertical hanging space for tomatoes, peas, beans, cukes, melons, etc. They hang down as well as being staked up. New shoots just keep forming and grow quickly downwards aided by gravity, producing clean, accessible, healthy, beautiful, bountiful fruit!

LEAN-TO PROTECTS GIANT PLANTS IN NOVEMBER!

Picture shows Bob with bountiful tomato plants, which were still thriving in November 2008 in our lean-to greenhouse, after a month of seasonal frosts outdoors! The tomato plant on the right hand side is grown in the ground, against the south wall of the warehouse building, in many feet of rich mulched soil. (Page 20) That one tomato plant is over 20 feet wide and 11 feet high! Yes! Really! The beams are white-painted 2"x6" lumber and the plant supports are a lattice work made of white-painted rebar from floor to ceiling. These bowls of tomatoes are just some of many that came from this giant prolific plant! It just kept on producing more and more tomatoes! On the left side are plants grown in raised beds made of heavy lumber painted white and lined with our poly on the sides. The soil underneath is left accessible to the plants' roots for extra nourishment and depth for the roots. In the background are white barrels of soil (also open in the bottom for access to more earth) and more plants! The roof, ends, and sides are our 11 mils superstrong woven poly. By asking around, we got some used glass windows for free and added some here for view and ventilation. People will often let you have their old windows if you offer to pick them up. The windows that is! On the front cover of our catalog you can see the external view of this lean-to greenhouse, which is built along the south facing wall of our warehouse. (At the time we took the cover picture, we had not yet added the free windows.)

Bob's Big and Little A-Frames

Another Easy Build-It-Yourself Greenhouse, with 2 Surprising options!

For thirty years I've published ideas and articles about Rebar Greenhouses. I like Rebar Greenhouses. Page 32 back cover lists page numbers for Rebar Greenhouse articles and pictures. Rebar Greenhouses continue to be excellent low-cost, easy-to-build season-extenders. **But now, after over thirty years of greenhouse building, I finally found what I think is an easily-built design for a wider greenhouse –** the A-Frame!

Bob in front of our 2006/2007 A-frame. Bob soon had to go inside because of the wind-chill factor outside that day. (The tiny A-frame in front is a movable cold frame for seasonal protection of outdoor plants in spring and fall.) The big A-frame is 35 ft x 60 ft x 18 ft tall. Note how the snow slides off without assistance from us. The Poly at front top needs to be trimmed off when the weather warms up again.

WHY THE A-FRAME DESIGN?

The A-frame design is low cost, is easy to design and build, even for amateurs, and it heats up fast, It's strong, attractive, and very stable if anchored by stakes or rods. A-Frame greenhouses can be made wider and stronger than rebar greenhouses. Wider greenhouses are easier to heat in the winter, because of fewer square feet of outside walls per amount of inside space. There is just one basic shape to make, an A . . . Two legs and cross beams on each. Two persons can put one together easily. A small A-frame can even be made solo.

WOOD

You can use recycled lumber or buy new lumber. (We used recycled lumber.) **I recommend pressure-treated lumber to resist decay, because greenhouses can be hot and humid.** If you don't use pressure-treated wood, at least the sill plates on the ground should be treated wood. Never use creosote in a greenhouse. Copper or zinc based treatments are best according to what I have read. I buy lumber seconds at half price from lumber stores. It may be bent a bit, but in a greenhouse that's not critical. **Paint everything white and be sure to install lots of vents. See Page 6 "To Prolong Your Poly Life Do This."** Page 32 lists the page numbers of other articles too.

SIZE AND SHAPE

Our A-frame greenhouse is 35 feet wide about 18' tall. It is cross braced inside. The snow slides off nicely by itself, meaning my studs can be 8 ft apart with horizontal cross pieces. **See photos.**

CONSIDER USING A STEEP ANGLE!

Consider your climate. Up here in the north, I prefer a very steep angle/slope. Why?

1. No roof-shoveling. I don't like shovelling at 30º below zero Fahrenheit. And with steep walls I don't have to shovel the roof. The snow slides off really well all by itself when the structure is steep.
2. Snow that's already slid off the structure can't collapse it from the top down. It isn't on the top.
3. In winter when the sun is low in the sky, a steep slope catches more of the sun, because the sun then strikes the wall/roof at closer to a 90º angle, collecting more heat and light. More heat and light can get into the greenhouse because…the snow slides off, remember? I love it!
4. Air circulates better in a steep high structure. Better air circulation promotes healthy plants.
5. Hot air is easier to ventilate with a tall building because hot air rises, vents built high up in the ends draw out the summer heat, and then your low vents can draw in some fresher cooler air. This reduces or sometimes even eliminates the need for fans and the use of electricity, depending on where you live.
6. Here are a few more reasons why you might want a tall greenhouse. Tall plants such as sunflowers, corn, even some trees, can be grown in a tall A-frame. In a tall greenhouse you can have multiple levels or tiers of plants. This is great for the creative and ambitious "green-thumber." In our warehouse I grow flowers on a shelf that is ten feet up in the air. The effect can be quite dramatic. Having certain plants up high saves space lower down for other plants or work. We use the lower part for making poly pieces for our customers in the warehouse, or growing other plants like tomatoes, grapes, berries, herbs, and so on in our greenhouse. If you try this multi-level gardening, be sure to make the upper levels strong enough to be safe. We'd love to have a picture of what you do! Please let us know whether we have your permission to put into in our catalog and/or on our website. Thanks!
7. Steeper angles may increase survival chances for your poly. We had a thunderstorm with category one hurricane force winds. Big trees snapped in two, and our lower-sloped metal house roof got dents in it from branches torn from their trees, but our 20' tall A-frame garage, with fallen tree limbs around it, had no damage. I find A-frame shapes are very stable in wind, compared to vertical walled structures.

CHOOSING THE ANGLE AND HEIGHT

To choose the angle, there are a number of methods: you can make a scale drawing on paper, you can use twine or string to lay out the pattern on the ground, or you can use the $a^2 + b^2 = c^2$ math formula for calculating the dimensions. You can even just start right out with wood, if you already have some stored away. Whichever method you use to choose your angles and height, when you have something you like, try making one A with wood before buying and cutting all kinds of pieces.

continued on page 14

Bob's 2004 Lean-to Greenhouse

Look on front cover of this catalog to see photo of and article on our passive solar lean-to greenhouse.

Bob's Lean-to Greenhouse on our former Low-Cost 1980 Warehouse of Recycled Materials

The sketch shows a cross-section of a south-facing greenhouse built into the south part of my workshop with poultry in a sunken or excavated part in the rear along the north. They give off carbon dioxide, which the plants love. The back wall and part of the side ones are built from

three foot long pieces of railroad ties stacked up, three feet thick, with no nails used. Earth from the excavation is banked or bermed up on the outside up to the roof. All this provides a "dirt-cheap" but very energy-efficient wall. The dirt floor of the workshop is covered with our thicker woven poly keeping it clean. It lasts very well. The dirt floor also holds the heat from the greenhouse wall. The walls are also covered with the poly, as is the roof which costs less and is faster to install than shingles. This in turn is covered with loose material to prevent damage from hail etc. Heat efficient structures can be built inexpensively if done yourself !

Bob's 1980's and 1990's Home Lean-to Greenhouse

Our home greenhouse was a season extender, and it was also a vertical solar collector. It was 40 feet long and covered the south side of our house. It was 12 feet high, 6 feet wide at the bottom, and the lean-to part of it has a 65-degree slope. I used railroad ties for the wall foundation supporting the rafters. The total cost was about $300. It can reach 120 degrees F. at the top when 20 degrees F. outside. This heat was vented into the house with a fan or by opening the windows. Plants were easily tended in the bottomless 40 gallon drums lining the north wall along the house, which as I explain in the Rebar article is a good way to store heat at night, in my opinion. The watermelon, cantaloupe, cukes and tomatoes climbed up the wall on fencing wire, a jungle hanging down from 11 feet high! I even cultivated a very large leafy luxuriant grapevine in there. This was a favorite feature of ours, and produced tomatoes well into the start of winter.

Bob's Big and Little A-Frames *continued from page 13*

TESTING YOUR DESIGN WITH WOOD

Here's how you can test your design with wood. Lay two pieces of lumber on the ground in a pointy V shape, and put a nail though the two of them to form a pivot. Then move the sides (legs) back and forth until you get the angle you like. Then to see what the height would be, measure while it's still on the ground. From the point of the upside-down V, measure down the center of the V, down to what would be the center of the base. When you get something you're satisfied with, take a pencil and draw a line on your sample boards to show yourself what angle to cut the boards so they will meet at the top nicely. Cut two leg pieces. Then determine what size triangles to cut from plywood or metal to attach to the front and back edges of the peak of the A. Finally, find out the length for the cross beams by putting a piece of wood across the A at the appropriate height and marking it with a pencil to show where to cut. The appropriate height varies slightly with the intended use of the structure. If your A-frame is to be a machine shed, you will build a much taller A with a much higher cross beam than if you are making a greenhouse. We built a big A-Frame shed to store our snow-clearing tractor and our pickup truck, as well as lumber for projects. For a greenhouse, you would probably want a cross beam about 7 to 10 feet up from the ground, so that you can hang plant baskets from it in the summer, and tack a temporary ceiling (of poly) on it in the winter to contain the heat and keep it close to the plants. Think about all these things as you design and as you tweak your design. If the first sample works out the way you want it to, you're ready to cut all the other pieces to match, or call in an experienced carpenter or friend to help you get it the way it needs to be.

Willie attaches poly to our A-frame in September 2006. Glass windows on the lower third of the east end let us see who is entering the yard.

CUTTING THE LEGS, CROSS BEAMS AND TRIANGLES FOR THE A'S

For each A you want to make, you need two leg pieces, two triangles of plywood or metal (one for the front and one for the back) to secure the legs together at the top, and a cross beam to secure the legs the proper distance from each other further down. It is this cross beam that makes the A look like a capital A. A tall A will need two cross beams for stability, one about 7 to 10 feet from the bottom and the other higher up. Once you have a working template for the five or six pieces of the A shapes, cut the rest of the lumber to match your templates.

MAKING THE A'S

Each pair of legs should be joined at the top and at the cross beam. Join the leg pieces together at the top with long nails or screws to form the legs of the A. At the top of each A, attach triangles of plywood or metal and use those to join the top ends of the legs of the A together securely. Attach a cross beam at about 7 to 10 ft up from what will be the bottom of your A, or at the appropriate height for the intended use of your building. A tall A needs an extra cross beam higher up. This makes the cross-piece of the A, adds structural strength, keeps the angle even, and will later give you some cross pieces on which to attach a temporary plastic ceiling in winter to contain heat and hang baskets of flowers or other plants during the growing season. *See "Temporary Inner Ceiling" (three paragraphs further in this article.)*

continued on page 15

Bob's Big and Little A-Frames *continued from page 14*

PREPARING THE BASE AND ANCHORING IT TO THE GROUND

To prepare the base sill plates I nail together two thicknesses of 2"x8" lumber to make 4"x 8" beams for the sill or I make a double layer of 2"x6" lumber to make 4"x6" beams to use for the sills. Remember they should be made of treated wood. (See "Wood" info near the start of these instructions.) I drill ½" diameter or so holes in the sill (bottom plate) every 8 feet. To anchor the base of the structure to the ground I pound 3 or 4 foot rebar or pipe through the drilled holes into the ground with a sledge hammer. Then I bend over the top few inches with the sledge hammer. This will help prevent the sill from pulling up during windstorms.

RAFTER SPACING AND ANCHORING THE A'S TO THE BASE

I'm now using eight foot spacing on the steep tall A-frame because the woven poly I sell is strong. To make strong supports use 2"x6" or 2"x8" treated lumber. Attach stringers of lumber along the side to join the A's into a long enough row to make the length of building you want.

TEMPORARY INNER CEILING FOR WINTER HEATING OF A TALL A-FRAME

To more easily warm the planting area of a tall A-frame in the middle of winter, temporarily attach poly to the lower crossbeam to conserve heat. This stops the warm air from get too high up and too far away from the plants. Take off this temporary low ceiling once summer comes. In summer you want the warm air to rise higher and be vented out the tops of the ends.

Interior of A-frame, still under construction, showing small interior starter greenhouse, which warmed up to 68 degrees F inside, by solar heat alone, despite the wind-chill factor outside, and the ice on the inside walls of the big A-frame. This will allow us to start seedlings earlier in the spring and heat only at night. We may find that we can simply cover the seedlings at night in spring and not have artificial heat out there at all. *See article.*

And now…..The Two Surprises! Little greenhouses with special uses!

Surprise # 1! "Indoor Baby" Starter Greenhouse!

Hidden safely away inside the big greenhouse is a little 7' x 20' x 8' starter greenhouse, where I can go to prepare pots and soil for an early spring start. As I write this, it is 1 pm and it's February. The temperature outside is 1º F which is -17º C, but inside the sheltered "baby" greenhouse it's 62º F, or +16º C, simply from the heat of the sun and the shelter of the big greenhouse surrounding it. Both are heated only by the sun. There was no man-made heater or furnace, just passive solar heat from the sun shining through the outer greenhouse and into the inner greenhouse. The big A-frame is covered by our 11 mils Superstrong "Clear" (translucent) Woven poly. The smaller, lower, rectangular greenhouse within it is built of our 11 mils Superstrong "Clear" (translucent) Woven poly. The shelves of the little inner greenhouse are covered with our white poly for the maximum amount of reflected light. The North wall of the little one is insulated, but both greenhouses are covered with just one layer of poly on the other walls. The inside of the A-frame poly is covered with a layer of ice. So it is freezing inside the A-frame greenhouse because it's so bitterly cold outside. But sunshine is shining through the ice covered poly and the sunshine enters the smaller greenhouse through its woven poly covering and has raised the temperature inside the small greenhouse to 62º F which is 16º C. It's almost unbelievable, with no heater. The surrounding big greenhouse is below freezing. Margaret went in there to warm up before going back outside to take more pictures.

Of course the little greenhouse also cools down at night, but not as much as outside. It would have to be heated if we wanted to use it while it is still this cold. But to start plants it's cheaper to heat this little sheltered inner greenhouse than to heat the entire surrounding big greenhouse.

Surprise # 2! "Outdoor Baby" A-Frames! Cute little starter shelters! (see pic on page 13)

Outside the big A-frame, and other places on the property, wherever we want to warm up the outdoor soil early or shelter outdoor plants early or late in the year, we can make cute little triangular prism-shaped starter shelters. They look like mini A-frames, and can be carted all around to wherever you need them. The top can flip open on warm days and be kept closed overnight and on cooler days.

So have some fun! Build yourself some A-frames, or whatever shape you would like to build. One of our customers built himself a little five sided greenhouse. Happy growing, whatever design you choose or invent. Consider climate, strength, safety, and beauty when designing what you decide to put on your property. In many areas you also need to get a building permit from your city, town, village, or municipal government. Better safe than sorry. Most are very helpful if you approach them ahead of time. There are lots of pictures of various shapes and uses of structures throughout our catalog. Enjoy!

BOB'S REBAR GREENHOUSES

(Pages 16,17,18, 19 photo on page 17)

How To Build A Frame Easily And Economically, Speed Up Plant Growth, Practically Eliminate Watering, and Cheaply Store Solar Heat. Detailed instructions for rebar greenhouses are on next pages. These ideas are simply personal experiences of myself and of others. Warning: Please check into safety for yourself before trying them.

WHY A GREENHOUSE? After talking with customers on the phone all over the States and Canada I've found the biggest problem is the short growing season. It's shortened by those wretched one or two days of frost that is preceded AND followed by fantastic growing weather! We here in Altona had frost (27 degrees F.) on August 27, 1982 that killed our tomatoes, potatoes, cucumbers, squash and cantaloupe. This was followed by many days in the nineties! It never got that frosty again till over a month later! We also had a solo "spoiler" frost on June 8th of that year.

I DOUBLE MY GROWING SEASON. No wonder greenhouses are sprouting up. My rebar greenhouse has only one layer of poly on it, yet in 1982 it prolonged the growth period by over 2 months. And it's only heated by the sun. In 1982 the frost-free growing season was only 3 months for warm crops. My rebar greenhouse doubled it.

BUILD YOUR OWN GREENHOUSE AND SAVE MONEY! I just read a very attractive full-color brochure advertising a 10' X 12' home-attached greenhouse at a special introductory price of $6000 (excluding fans and shutters). It's beautiful with double glass and laminated wood beams. Few are fortunate to be able to purchase such a jewel. So, build your own. I wanted an "El cheapo" freestanding greenhouse, which was simple to build.

EUREKA! I FOUND ONE! One day I suddenly devised a solution. Use rebar. Rebar rods are those long rusty-colored iron rods placed in concrete to strengthen it. I believe I built the first rebar greenhouse, but of course that won't make the Guinness book of Records! Directions follow on the next few pages for an 11' x 50' rebar greenhouse and a 26' x 65' rebar and wood greenhouse.

WHY THE ARCH SHAPE? The shape of our rebar greenhouse is like half a tube (i.e. Quonset). Tunnel greenhouses are quite popular because they heat up so fast, having less interior air to heat compared to some other shapes. Also the shape is very strong and eliminates the building of a roof and uses less material. It's so fast to erect that I still can't believe it. And it uses less poly to cover it than most designs per sq. foot of growing area. It is very wind resistant and deflects the wind over it. You can insert supports in it if your snowdrifts cover it, like here. With the long side facing south it is interesting that when the sun is in the south, no matter how high or low in the sky, the sun still directly strikes the greenhouse perpendicularly at some point in the curve, giving maximum heat and light. It's an ideal shape.

continued on page 17

REMARKS ABOUT REBAR

If you want a wider rebar greenhouse, you can buy longer rods or weld two together. In that case I would use one-inch diameter rebar. One advantage of rebar is that its small diameter blocks little light. For example all the rebar used in the arches of my 50 foot greenhouse take up less space that the cross-section of just two two-by-six pieces of wood! Impressive eh? I should mention here that rebar has grooves or corrugations in it, perfect for holding it in the soil, but, being rough it could abrade regular poly. That's why I only use the woven poly that I sell, as it's so tough. You can wrap the rebar with my poly, or paint it with several coats of white paint. Also, since the rebar lets in so much light there can be leaf burning with regular poly, however woven poly scatters the light preventing leaf burning.

GREENHOUSE IDEAS AND HINTS...

VENTILATION IS VITAL! I think ventilation is underrated in many noncommercial greenhouses. Plants can suffer heat stress over 85 degrees F., not die, but stop growing. You should have many vents and doors. If you are on a tight budget you can perhaps get a cheap or free fan from oil furnaces people throw out when they want to convert to natural gas, or wood, or electric heating. I've done it. They are excellent fans. If you want a fan and ventilation info. sheet send a stamped self-addressed envelope with FANS written in the upper left corner.

SHOULD A SECOND LAYER OF POLY BE USED INSIDE THE GREENHOUSE? The light is reduced a bit but the growing season is longer and your heating costs are sometimes up to 30% less. The second layer must be installed as tightly as possible as ANY cracks in it will allow dust in which coats the inside of both layers of poly and you won't be able to get at it, believe me and that dust really cuts down light. You may not need a second layer if you are not growing in winter.

HEATING YOUR GREENHOUSE. To heat my newest greenhouse, I'm using a double-walled water jacket outdoor wood stove with hot water carried through 1" plastic pipes to radiators in the greenhouse. For fuel, I use wood, paper, cardboard. Some people use coal, oil, natural gas or electric heaters.

BOB'S BIGGER REBAR GREENHOUSE: 26' x 65'

continued from page 16

WIDER REBAR GREENHOUSES NEED THICKER REBAR AND SOME GUIDE SOCKETS

Our 65-ft. x 26-ft. greenhouse was made using 3/4" diameter 32.5' long rebar and cost less than $200 for the frame! If I ever do another such large rebar greenhouse I'll use standard 40' long 1" (ONE-INCH) thick rebar! In order to get the arches evenly curved on so large an expanse, we came up with the idea of first **hammering short lengths of electrical conduit pipe into the ground as guide sockets** at the angle we wanted the rebar to leave the soil. Then the 3/4" rebar ends neatly fit into the 2-ft. long 1" diameter electrical conduit pipes pounded 18" into soil. For **one-inch rebar**, which **would be better**, you'd have to **use thicker diameters of conduit** pipe.

EXTRA BRACES OF LUMBER AND REBAR

The building process was similar to that outlined for the 11 x 50 rebar greenhouse described earlier, but the 26 x 65 because it was wider and longer required some additional steps. The 3/4" rebar was really too flimsy for the width involved and ended up having to be **braced all the way along with 2x4's** at the right and left side of each arch and in the middle because of snow and winds. We used **1/2" rebar diagonal 'braces' to tie 3/4" arches together**. Again, remember that 1" (ONE INCH) thick rebar would be better. It would still need cross bracing of course, just because of the width. We made vertical tomato stacks from left over rebar offcuts.

EXTRA VENTS, COVERING THE GREENHOUSE ENDS, AND WATER TRENCHES

It's solar heated, 80°F. when 32°F. outside on sunny days. All the wood is painted white for light reflection. There are **two large 6' x 9' hinged door vents** of wood and plastic which open outward at each end, hinged at the bottom, **several long side vents**, and a **water filled trench**. Raised beds were planted with watermelon and cantaloupe. Keeping plants heavily mulched reduces weeding and watering. Our woven poly cover is attached ONLY at the bottom along the long sides held by our **polyfastener nailed on 2x4" boards nailed to bottom of rebar 6" above soil to prevent rotting**. (Curl long nails in 2x4's around the rebar.) We **made the poly extra long** to **drape over and cover wooden ends, doors and vents**. See page 11 for more on attaching poly to the ends of a metal structure. We **made the poly extra wide** to form outside trenches along sides to catch scarce rain off greenhouse. We also **made poly channels inside** to fill 2' deep 5' wide woven-poly-lined trench on right **covered partly by pathway boards**. Ensuing humidity **prevents wilting at 100 degrees** F. Three months after planting, Tarzan-like squash, watermelon, cantaloupe and cucumber vines hung from rebar arches, hitting unsuspecting foreheads! Corn, beets, and raspberries grew inside as well. We grew all sorts of things. Compared to a wood frame, rebar lets in tremendous light, never rots, is fast to erect, cheap and strong. continued on page 18

A LARGER GREENHOUSE CAN COST LESS PER SQUARE FOOT

INCREASING FLOOR AREA BY 145% MAY TAKE ONLY 65% MORE POLY

GREENHOUSE "A" Say that Greenhouse A is a Quonset greenhouse 30 feet long by 11 foot wide (20 ft rebar rods). Floor area is 30 x 11 feet = 330 sq.ft. growing space. Including enough plastic to drape over each end by 7 feet, the poly cover needed is 20 by 44 feet = 880 sq.ft. of poly.

GREENHOUSE "B" Say that Greenhouse B is also a Quonset 30 feet long but is 27 feet wide (33 ft. rebar). Floor area is 30 by 27 feet = 810 sq.ft. growing space. Again including enough plastic to drape over each end by 7 feet, the poly cover needed would be 33 by 44 ft = 1452 sq.ft. poly.

COMPARING B : A FLOOR AREA B:A = 810/330 = 245%, POLY NEEDED B:A = 1452/880 = 165% In this example, increasing floor area to almost 2 1/2 x used only about 1 2/3 x as much poly. Larger structures use less poly and lumber/pipe/rebar per sq.ft. of growing area, and have less surface area of poly to lose heat!

BOB'S REBAR GREENHOUSES: Water Trenches & Raised Beds cont. from page 17

DRASTICALLY REDUCE WATERING ! HOW ? ..... TRENCHES MAKES A STEAMY JUNGLE ! Here's how to reduce hauling water to the greenhouse. Where the poly cover meets the soil on each side I have dug a shallow trench. The poly is laid over that, and anchored with boards and blocks. The rain then runs down the side into the trench. Another poly-lined trench from inside the greenhouse intersects this. A hole is punched into the first poly lined trench which lies over the bisecting inside trench and water is thus quickly channeled into the greenhouse. Down the center of the greenhouse I've dug an 18-inch deep 3-foot wide sunken pathway. This trench pathway is lined with woven poly and secured at the top with nails poked into the soil. Rain enters this trench from the poly-lined trench going to the outside. Boards are then laid across the sunken pathway at intervals to permit walking along it. What happens is amazing. All those thousands of pounds of water act as a giant thermal mass absorbing excess heat in the day and warming the plants at night. I water the plants by simply scooping water from the trench with buckets and drenching the plants in the metal barrels that line the pathway. Even though the temperatures are frequently in the nineties, I do not water often, sometimes as long as 4 weeks apart. Why? Two reasons. First, the water trough produces a steamy humidity, which envelops the plants like a fog...This helps prevent wilting even if it hits 100 degrees F. The leaves bathed in this humidity do not need much watering. Secondly, I heavily mulch all exposed soil. This lessens evaporation and also practically eliminates weeding. Tomatoes, melons and cucumbers seem to enjoy the humidity. Incidentally high humidity could spread mildew and fungus, especially in humid climates. In that case cover the water trench with a layer of poly beneath the boards. I've noticed the cabbage family prefer drier air.

ABOUT POLLINATION: In the large rebar greenhouse I had no problem. Probably because of the large 9 by 6-foot end vents the bees seemed to find their way in easily. And wind-blowing inside helps, especially in corn pollination. You can pollinate by hand with a tiny paint brush or aerosol spray. Pollination may be a problem with small insufficient vents.

ANY COMMENTS ? PHOTOS ?

I especially welcome YOUR feedback on rebar greenhouses (or any other type for that matter). These ideas are based on my experiences, and those of many customers who have tried rebar greenhouses since reading our brochure. I welcome your thoughts, feelings, experiences, triumphs and mistakes. I would especially delight in seeing any of your photographs. Black & White. Color. Drawings. Anything!!! Please give us written permission to use them in catalog and website. Thanks! - Bob & Margaret

USE RAISED SOIL BEDS INSIDE: (See page 21 on RAISED BEDS & TIRE GARDENS.) Inside my large rebar greenhouse I had several stacks of tires (three or four high) filled with earth. Some sources now advise against tires. Though, I can find no definitive proof that tires are a health hazard, I have changed to growing in barrels and blocks myself for the most part. I fill the raised beds with soil from the sunken water pit. At one stage the watermelon plants on the ground were one foot long while the plants planted in the raised beds were six feet long. That's due to the difference in soil temperatures after spring thaw. In southern latitudes there may be less variation in temperature.

USING OTHER PIPE: PVC, CONDUIT A tunnel greenhouse can easily be built from WHITE (not black) PVC pipe (say 2 inches in diameter) if you have the proper connectors. On the other hand PVC pipe can cost more. Rebar is easy to fasten with twine. And it can be poked into the soil easily. Another material some use is white or silver electrical conduit pipe but you need to own or borrow a pipe bender machine.

POLY OR GLASS? I prefer to use 11 mils Superstrong “Clear” (translucent) Woven Poly for large greenhouse expanses. It's fast, light, easy, and almost foolproof to put up. Glass, because it is heavy and breakable, requires a non-heaving expensive foundation. It is time consuming to mount and I do not like repeatedly caulking hundreds of feet of glass perimeters, which always seem to leak air somewhere. With small windowpanes all those frames can cut back on the light significantly. Many commercial greenhouses in the last few years have extensively switched to poly from glass, drastically lowering their labor costs (no glass upkeep) and virtually making the structures airtight. If you are rich, you can buy expensive tempered, break resistant, hail resistant glass.

continued on page 19

BOB'S REBAR GREENHOUSE: 11' x 50' OR BIGGER! OR SMALLER! *continued from page 18*

For the 11' x 50' greenhouse I used rebar **20 feet long by 1/2 inch in diameter**. They cost me much less than lumber. The **11' by 50'** greenhouse cost about $100 for the rebar. I used **about 18 rods for the length, another 8 for the diagonal bracing & top "spine"**. **It took an hour for us** to put up the rebar hoops. Framing the ends in with wood took some additional time. It's just 6 feet high so as to make it as wide as possible & give it a lower profile to cooling winds. If you need extra height make it narrower but taller.

THE FRAME

DECIDE WHAT DIRECTION TO ALIGN THE LONG AXIS OF THE GREENHOUSE. In northern or cool areas you will probably want to run your greenhouse east-west, so that the long side faces south for early spring and autumn growing. That way there is maximum solar heat gain in those few hours just before till after noontime when the sun is in the south. In southern latitudes I'd probably face the greenhouse east and west to lower noontime temperatures, though with the sun being so high in lower latitudes it might not make much difference.

ARCHES: POKE the first rebar rod into the soil. Stick the other end in (it bends easily). This is the first hoop! Wasn't that easy? **CONTINUE MAKING ARCHES IN THE SAME WAY.** I spaced the others about 3 feet apart. The woven poly I sell can take 6-ft. spacings!

TOP BRACING: Tie the arches together by fastening a rebar along the top, joining the arches. I use that cheap nylon twine (binder twine or baler twine) that farmers use to tie up hay bales. It comes in large rolls.

SIDE BRACING: For essential stability fasten additional rebar rods at diagonal angles along the sides.

VENTILATION: Due to its optimal shape the rebar greenhouse becomes hot quickly. LARGE openings should be built into BOTH ends and BOTH sides of the structure for ventilation.

VENTS AT BOTH ENDS: I built large 9 by 6-foot vents in each end of my large rebar greenhouse. They are hinged at the bottom and open outward so as to conserve greenhouse space. Likewise the doors. See page 11 for more on attaching wood and poly to the ends of a metal structure.

VENTS ALONG BOTH SIDES: Nail studs (e.g. two by fours) horizontally to the rebar arches just above the ground (to prevent rotting). Then nail another set horizontally and parallel to the first from one to three feet away. Then you can install a long vent on them, hinged at the bottom studs so that they open out and down. That vent can simply be a piece of plywood or poly on a frame or just drape the bottom 3ft of poly and lift up with poles when hot. I've done that. It's fast. I built some window vents higher up as well, but its harder to reach and do it easily. The high humidity caused by my water trench inside the greenhouse helped my plants not wilt when it was hot. Even so, install as many vents as you can as a Quonset shape promotes fast heat gain in sunshine or just lift up the flaps with poles when hot.

DOORS: The door itself can be new or used, conventional or made of a poly-covered rectangle (my favorite). After deciding what kind of door I want, I lay the door on the ground. Then I build a wooden frame around it and hinge the door to it. Then I set the whole frame upright beneath the end rebar arch. Then attach it to a vertical stud, which on top is secured to the rebar arch by long nails curled around the rebar rod.

PAINTING/WRAPPING: Rough rebar rods if left in a rusty brown state can get quite hot and this will shorten your poly life somewhat. To reduce heating you can paint the rods white or wrap with poly to make it smooth, or cover with white (not black, don't use coloured hose) PVC pipe.

MATERIALS LIST FOR AN 11' x 50' REBAR GREENHOUSE:

ORDER FROM NORTHERN GREENHOUSE SALES INC:
- 20' x 66' of 10 to 11 mils Superstrong "Clear" (translucent) Woven Poly
- 3 rolls cinchstrap

PURCHASE FROM YOUR LOCAL BUILDING SUPPLY:
- 24 pcs rebar rods 20' long
- 200' of 2" x 4" lumber
- 1 gal white latex paint
- 70 u-shaped nails
- 70 rebar twist ties
- 36 pcs 2' by 1" or 2" pipe

THE WOVEN COVER

We custom heat-seal the 10 foot or 12 foot widths to make any width you want. Order your poly long enough to drape over the ends as well as the sides. You'll need to bring it around the ends to fasten it, so order it large enough. (It's important ! Our 11' x 50' rebar greenhouse used 20' x 66' of woven poly.

ATTACHING THE WOVEN POLY: The next step is to attach the poly to the frame. The first alternative (nailing) is more secure. The second alternative (burying) is more easily changed, rearranged, or removed, but usually not as tight.

METHOD A (NAILING): Nail boards to the rebar rods along the ground using U-shaped nails. The poly can be fastened to those boards using our cinchstrap and wide-headed roofing nails. Then the end poly is pleated into folds and nailed down tightly to the wooden studs that support the doors and end vents.

METHOD B (BURYING): There is also a different way to secure the bottom edges. I sometimes lay the poly flat on the soil, place boards on that, and anchor with heavy stones or concrete blocks 4 inches apart. This way no nails pierce the poly and poly can be removed in the summer.

MORE ABOUT OUR 11 mil SUPERSTRONG "CLEAR" (translucent) WOVEN POLYS

:-) A Longer, Chattier List for Folksy Types and Those Who Like Details :-)

1. AREA OF USE: Virtually unlimited. Successfully tested in the cold Canadian Yukon and Northwest Territories, Alaska, and in all areas of the United States and of Canada, from the Arctic Circle to South America, from the Atlantic to the Pacific and from one end to the other of the great central regions of our continent. Although we're located on the Canadian-American border, we have a 140 degrees F. temperature range (minus 40 F. to plus 100 F.). Used by hobbyists, backyard gardeners, farmers, and commercial growers.

2. ULTRAVIOLET STABILIZER AS PROTECTION: Ultraviolet solar radiation lies just beyond the violet end of the visible spectrum. It quickly breaks down untreated plastic, sometimes in 5 months in high radiation areas such as the prairies and plains, where there is less cloud and water vapor in the air. It happened to me with regular untreated poly. Our “clear” (translucent) woven poly is treated on both sides and in the middle to resist UV breakdown. This is not always true of other brands of woven polys. Some are UV stabilized on only one side, or only in the outside coatings. Some brands are not UV stabilized at all. We sell only UV stabilized poly in our “clear” (translucent) woven polys.

3. LIFE EXPECTANCY: Most of our customers get at least 4 years and some get 10 years or more in shaded or cloudy areas. Poly life depends on weather factors, and quality of installation and operation. Specifically: Placing the rafters' close enough to minimize flapping in wind, cross bracing the structure and/or rafters to prevent vibration in the wind (mentioned elsewhere), sanding the rafters smooth, wrapping the rafters with plastic, installing on a warm day to get plastic tight, keeping kids and shovel blades off the poly, protection from severe thunderstorm winds, freedom from large, jagged, gale-driven hailstones, and amount of sunshine.

4. WATER AND CHEMICAL RESISTANCE: Triple layered woven poly is water-proof, rot and mildew resistant, and resistant to most chemicals (inorganic acids, alkalis, aqueous salt solutions) (particularly important in coastal areas like B.C., the Maritimes, Washington, Oregon, Atlantic states, and Gulf Coast).

5. PUNCTURE, PINHOLE, & CAT RESISTANCE: Punctures are the bane of unwoven plastics & pinholes or punctures can easily expand like a tear in your pants. Our woven poly's thickness, density, & cross-weave is very resistant to punctures. I sometimes strike my greenhouse covering with a rake handle and it has caused no holes. It has a higher impact resistance than glass! Also, for some reason, my cats love me. When I'm in the greenhouse they try to break through. However, our woven poly resists them due to its toughness and also due to its translucence, as they can't see through it. **TEST IT YOURSELF!** Puncture our woven poly with a nail. Try to expand the hole with your finger, you'll find it resistant to expansion due to the cross-weave. Try this same test with "regular" poly.

6. STRENGTH & TOUGHNESS Its dense cross-weave makes our superstrong woven poly stronger than the thicker non-woven plastics. Thus its thickness, weave, high density, and lamination all add up to extra toughness.
Try tearing it with your hands. If you can tear it, write me (and mention the size of your hands). Outer space aliens are not eligible.
Two more "strength experiments". The following "experiments" can be performed at your own risk. We don't really recommend them. Please make sure you use safety equipment and common sense to protect yourself and others from harm if you try them. Most of you will find it safer and more convenient to just conduct the experiments in your mind and imagine the results, based on what you know.

"Experiment A" (Please remember safety precautions!) Try throwing rocks of equal size at three discarded window frames covered with woven poly, regular poly, and glass. The results of this experiment will *continued on page 21*

BOB MULCHES EVERYTHING!

ACTUALLY I MULCH EVERYWHERE! I'm a mad mulcher. I planted 1000+ trees around our yard and mulched them 8 inches deep, less weeding & watering are needed. (The trees are to shelter us from our fierce winds). Over the years I've begged, borrowed, and hauled hundreds of pickup loads of spoiled straw, hay bales, and other people's leaves to cover every square inch of our trees and vegetable gardens. In fact I plant my potatoes and vegetable seeds such as beets and corn on TOP of the soil and cover with straw for perfect weed-free germination. No more digging in the soil! The millions of happy worms do that for me. I get so excited about mulching.

About the only disadvantage to mulching is that it insulates the soil in the spring and slows the thawing. So it's pulled back enabling the soil to warm up. When the garden crops are big enough to identify, pull the mulch back close to their stems and weeds will have no chance to germinate. As you can tell, I'm a fan of Ruth Stout's book HOW TO HAVE A GREEN THUMB WITHOUT AN ACHING BACK. It's available in many bookstores. You can also get it from Rodale Book Club. Like I said, I MULCH EVERYWHERE! As well as outdoors, I mulch in the greenhouses in raised beds of various sorts and even in the pathways.

Two of my favorite kinds of raised beds for the greenhouse are concrete block growing beds and barrel growing beds. Mulch in barrels, you say? What's this guy doing? Well ..... When mulch is pulled back to allow ground level outdoor rows to warm up in spring something else happens too: pesky weeds germinate! They need to be pulled up before seeding can take place. But in the greenhouse with the mulch at the top of the metal barrel or concrete block bed, it can be left there all year, because the long metal or concrete sides of the in-greenhouse raised beds warm up the soil from BELOW, unlike flat rows outside where the soil warms from the TOP only. Raised beds promote faster plant growth. See page 12, Bob's Raised Growing Beds + Giant Mulched Plants pic.

MORE ABOUT OUR 11 mil SUPERSTRONG "CLEAR" (translucent) WOVEN POLY cont from page 20

persuade you that our products have great strength. Strength is important to resist rocks and branches, to resist hail, high winds, animals such as dogs, cats, birds and rodents, neighboring kids, and heavy snow loading.

"Experiment B" (Please remember safety precautions!) Tack down tightly a piece of woven poly on a frame the same size as a discarded framed window. Do the same with regular unwoven poly. Jack up all three frames a few inches off the ground. Then (in appropriate safety gear only) start walking by turns on the glass, the plain poly, and the woven poly. Tell me which two break first; better still, tell others! Our woven poly wins! & you win, if you buy it for your buildings & projects!

7. STRETCH & SAG RESISTANCE: Our woven poly is highly resistant to stretch due to the dense tight weave. Try stretching it & stretching regular polys. Once regular poly is stretched it can sag inviting destructive flapping in gales. Woven poly will resist stretching & keep its original tautness well under stress.

8. COLD WEATHER RESISTANCE: Most materials, including plastics, contract in cold weather like mercury in a thermometer. Formerly I covered my greenhouse with ordinary 6 mil poly. At low temperatures regular 6 mil poly turned very brittle and shatter-prone. One frigid day a winter gale lashed that ordinary plastic, shattering it into thousands of shreds blowing them over the countryside. Woven poly has less contraction and less brittleness than non woven polys. The dense cross-weave fibers resist contraction and give it added strength to resist cold brittleness. The thickness & lamination also add strength. Most greenhouse polys in use are 2, 4, or 6 mil. Put our 11 mil Superstrong Woven “Clear” (translucent) poly and some ordinary poly into your freezer. While both are frozen solid, try bending and flexing them. Since most freezers are only at 0 degrees F., it's more effective to try the test outdoors after temperatures dip to 30 or 40 below zero. Our woven poly has resistance to cold cracking down to minus 100 degrees F.

9. HOT WEATHER RESISTANCE: Plastic expands in the heat. One summer day it got pretty hot here. One year before starting to sell woven poly, I covered my greenhouse with a less expensive 6 mil plastic. It expanded and sagged in the heat. Along came a prairie thunderstorm and the winds started flapping that loose plain 6 mil plastic like a rag doll. It was over in minutes. The covering hung in shreds. But our poly with its dense poly weave stands up well here in summer storms. If you want to test it, mount our poly and some plain poly on two identical frames corresponding to the space between 2 of your greenhouse rafters. Turn your house temperature up to 95 degrees. Turn your teen's mini jet aircraft engine up to a wind speed of 80-mph (just kidding) and watch the results.

Woven poly cover of our woodshed survives tree-breaking winds. June 19, 2005

10. WIND RESISTANCE: Our woven poly is highly resistant to wind stress at any temperature due to its strength. This is important on hot days (#9) when the greenhouse is even hotter inside than out, and it's important on cold days (#8) when the winds of winter howl mercilessly.

11. HAIL RESISTANCE: I hate hail. Many greenhouse owners fear hail more than heat, cold, or gales. Large jagged wind-blown hailstones can destroy non-woven coverings & the crops in seconds. Small hailstones have taken paint off my house. Our woven poly is resistant to hailstones due to its thickness, lamination, high density & the tight weave. Small hail bounces off it like a kid on a trampoline. If you live in a hail-prone area, a steeper angle is better ideally. It is cheaper to cover a greenhouse with plastic than with glass if you get repeated devastating hailstorms. It's also easier and faster to install or replace in an emergency. **Here's another "Silly Experiment"**: Try this: (Again, please remember safety.) Mount glass, woven poly, and regular plastic in identical frames. Hire Hank Aaron if you want, and start throwing ice cubes of increasing size at the glass and plastic. Let me know the results. (It's best to do this test where strangers and predator aircraft can't see you)! See "The Great Ice Cube Caper" on page 24.

12. LIGHT PROPERTIES: Woven poly is not clear like glass. It is translucent, diffusing light in all directions.

A. DIFFUSION: When I'm at home I can look through our bedroom window into the lean-to greenhouse on the south side of our house. In full sunlight I can read and am not blinded by the light since a soft, diffused, uniform, glare-free light is produced by our woven poly. Houseplants thrive, the carpet doesn't fade, and strangers can't see in. A few of our customers run photographic studios & one studio owner told us our woven poly creates the ideal conditions for color work and editing because of the bright clear well-diffused light.

B. LIGHT TRANSMISSION: Most plants require 65% to 85% of available light for optimum growth. Woven poly's light transmission is very favorable comparable to greenhouse fiberglass. Commercial greenhouses are growing high yielding tomato and cucumber crops under it, crops needing maximum light. Rafters can be farther apart than for glass permitting more light as well. Optimum light transmission remains high throughout our poly life due to protection from the yellowing or discoloring common to many other coverings.

C. ENTRAPMENT & INTENSITY: The WEAVE reflects and "traps" light, lowering light escape, bouncing it around like a frosted mirror. Many comment how bright it is in a woven poly greenhouse on a cloudy day. Plants love it.

D. TRANSLUCENCE PROTECTS AGAINST LEAF BURN (SO NO WHITEWASH OR SHADECLOTH): Leaf burn is a common problem under clear glass or plastic, especially on hot, clear, windless days. The solution used to be to whitewash and/or add light-shading materials such as shade cloth or lath. An undesirable side effect of whitewash is that the light reduction is permanent, even on cloudy days when you don't want it. In many cases shadecloth continued on page 22

MORE ABOUT OUR 11 mil SUPERSTRONG "CLEAR" (translucent) WOVEN POLY cont from page 21

or whitewash are not even needed with woven poly's nice even light distribution. Woven poly provides an excellent diffused light, lessening glare, hot spots, and sun shafts, thus reducing or eliminating damaging leaf burn. The extra labor cost & extra shading-product cost is eliminated, all with no reduction in light.

E. TRANSLUCENCE DEVELOPS MORE UNIFORM PLANT SHAPE: A clear covering on a sunny day casts intense shadows, in the greenhouse corners and below rafters. Woven poly diffuses (scatters) the light similar to a day with a high thin cloud cover where the light comes from all directions. You may observe the lack of shadows. Woven poly acts as a dispersion screen at no extra cost. This illuminates the plants from all directions, eliminating shadows, and giving a more uniform plant shape. They won't become one-sided trying to face the sun. Light penetrates lower leaves better.

F. TRANSLUCENCE DEVELOPS BETTER FRUIT & FLOWERS: Hot spots and varying temperatures can lead to flower malformation and decreased growth. Diffused (scattered) light reduces such fluctuations and the moisture content of the buds and fruit becomes more uniform.

G. TRANSLUCENCE ALLOWS MORE GROWING AREA: The need for re-racking (moving around) the plants is reduced as more light reaches around and even in some cases under the benches as it comes horizontally as well.

13. LESS LEAKAGE: The large width and length of poly panels mean less leaky joints and less edge/perimeter length. This cuts down on leakage of water and air. Little sealing is needed, compared to glass. It eliminates most of the potentially expensive and drafty leaky joints typical of many glass greenhouses.

14. HEAT LOSS MINIMIZED: The flat surface has 20% less surface than corrugated types thus reducing heat loss and requiring less energy to maintain the desired temperature.

15. SPEED OF INSTALLATION: It's far quicker to install a wide sheet of woven poly than the smaller widths and lengths of glass or solid plastics. Extra sealing time is eliminated (just nail edges down instead of using a caulking gun). Also eliminated is the continual re-puttying of edges that glass can require.

16. WOVEN POLY ALLOWS LIGHTER SUPPORTING STRUCTURES: Glass requires a stronger, heavier more rigid structure, to carry the dead weight. Poly is lighter and can thus be attached to a lighter frame, and resists frost heaving.

17. WOVEN POLY ALSO ALLOWS LESS EXPENSIVE FOUNDATIONS: Woven poly weighs less than glass and is not breakable. This eliminates the need for heavy foundations which frequently have to be extended beneath the frost line (6 feet deep in this area) to prevent the heaving in spring which could break glass. Such a foundation may cost more than the greenhouse itself. With woven poly I can use the appropriate dimensions of treated lumber to make the bottom plate, which then "floats" on a few inches of gravel, for a very strong but cheap foundation.

OTHER INFORMATION SOURCES...(let me know if addresses change)

EACH OF THESE HAVE MAGAZINES & BOOKS, some also have VIDEOS & SOFTWARE:

- MOTHER EARTH NEWS, Hendersonville, NC. 28791, Tel. 1-800-234-3368, Website: www.motherearthnews.com
- ORGANIC GARDENING - Rodale Inc., 33 East Minor St., Emmaus, PA., 18098, Tel. 1-800-666-2206, e-mail: og@rodale.com, Website: www.organicgardening.com
- AMERICAN NURSERYMAN, 223 W. Jackson Blvd., Ste. 500, Chicago, IL. 60606-6904, Tel 1-800-621-5727, (ILLINOIS, 312-427-7369), Fax 1-312-427-6346, Website: www.amerinursery.com

GREENHOUSE DESIGNS: **BRACE RESEARCH INSTITUTE, PUBLICATIONS DEPT.,**
Faculty of Engineering, Box 900, Macdonald College of McGill University, Ste. Anne de Bellevue, QC, H9X 3V9, CANADA
Tel. 1-514-398-7833, Fax 1-514-398-7767, E-MAIL: AE12000@Musica.McGill.CA
Ask for a comprehensive 15 page list of publications (covers wind energy, solar drying, solar greenhouse, pamphlets, designs, energy storage and generation, and of course, the world-famous Brace design for a solar greenhouse).

T&T SEED CATALOGUE specializes in seeds adapted to Canada's harsh climate. Their latest full color expanded catalogue features vegetable seeds, fruits, nuts, shrubs, supplies, flower seeds, bulbs and roses. They give speedy service to their customers. We think you'll be pleased with their products and service. We are not related to the owners of T & T Seeds, but we have known them for many years as business friends and respect their integrity in business. T & T is a family owned business. We usually send their catalogue with our Canadian orders. Tell them Bob & Margaret Davis (Northern Greenhouse Sales Inc.) gave you their name.
To contact T & T Seeds, Telephone # 1-204-895-9962 (people). Fax # is 1-204-895-9967 (machines).
Write: Attn. Kevin Twomey, Dept. NGS, T & T Seeds, Box 1710, Winnipeg, MB. R3C 3P6. (Sorry, Canadian Orders Only)

MORDEN NURSERIES CATALOGUE P.O. Box 1270, Morden Manitoba R6M 1B2. Located between Morden and Winkler on Hwy. 3 & 14. Phone: 1-204-325-2254, Fax: 1-204-325-5763, Email: mordnurs@mts.net

PHOTOS AND CUSTOMER COMMENTS

COTTAGE CHEESE CONTAINER PLUGS POLY PUNCTURE FOR 3 YEARS! In December 1993, a lady from B.C. wrote to say, "The little greenhouse I have has been great but I am now planning a 12 x 30 rebar one. The woven poly was punctured once in a gale that brought a large cottonwood branch down on it, but I plugged it with a cottage cheese plastic tub which has held up for about 3 years, so no problem. Thanks."- *J.A., British Columbia*

J & M'S GREENHOUSE (TEXAS) Photo shows the completed greenhouse frame prior to installing our superstrong woven poly. The sides are designed so that the poly can roll up in the hot summers. Rafters are all painted white for beauty, light, and to prolong the poly life. Soil, manure, and compost filled the raised growing beds which were installed after this photo was taken. M and J gave us all the victory "V" after completing their beautiful greenhouse.

STRONG POLY, SCATTERS LIGHT We received the following letter in Dec. 1984 from Mr. Thompson in Indiana. "Our greenhouse...is heated by the sun and...horse manure...and covered with your woven poly...It's unbelievably strong. I can walk on the roof of our greenhouse. (I weigh about 180 lbs.) When we were putting the plastic on the greenhouse we got it crooked in one place and had to move it. We were using 1/2-inch T50 staples and I thought I'd tear the plastic off over them. When I pulled up the plastic it pulled staples out of the wood!" (Memo from Bob: it's best to use staples or nails WITH lath, polyfastener, or cinchstrap, not by themselves.) Mr. Thompson continues, "Another very, very, very impressive feature of the stuff is the way it scatters light. On a cloudy day I noticed my eyes adjust as I walked into the greenhouse. It's a lot brighter inside. But yet on a sunny day direct sun didn't burn the plants. I realize you said that in your brochure but I didn't fully understand or appreciate the fact until I saw it happen. The stuff is worth raving about...one of our friends wants very much to make a greenhouse after seeing ours. We gave them samples of your plastic and brochure...It's great stuff. It's strong, durable, lightweight, easy to work with ....." - Mr. Thompson, Indiana

GREENHOUSE POLY STANDS UP TO HURRICANE SANDY It has been a crazy-weathered year with two hurricane force winds. The first one was a fast and furious storm with 70-80 mph gusts, and Hurricane Sandy was the last one threatening our homes, trees and of course my 20' x 20' greenhouse. Each time, in the aftermaths, my neighbours would check on it to see how much destruction there would be to the "thin plastic" I'm using. They are always shocked that it's not even scratched. The latest one, Sandy, with 90 mph sustained winds, blew a hole in the corner of the greenhouse, popping out 10 extra-strong military-grade 75# cable ties, but get this....the plastic is intact, not so much as a rip. Man, this stuff is strong! I wanted to thank you for the conversation, friendliness, and excellent price you gave me. The plants have grown so well, and even in the winters we have here in Zone 7B, it stays pretty warm on sunny days without any additional heat sources. Meir L. from Baltimore, MD

Prices: See Pages 4-5 *Ordering Information: See Pages 30-31*

PHOTOS AND CUSTOMER COMMENTS

A FIFTY-FOOT HIGH PYRAMID GREENHOUSE IN ONTARIO CANADA COVERED WITH OUR 11 MIL SUPERSTRONG WOVEN "CLEAR" (translucent) POLY.

PRODUCTIVE GARDEN:
Mrs. V O in Manitoba wrote: "We are very pleased with the woven poly. It certainly is superior to the ordinary poly which we had on it before and needless to say was torn by a small wind. The woven poly certainly stands up to weather elements. It was easier to install and the wind doesn't even lift it. It prevents plants from burning. The plants did very well, resulting in a very productive garden."

THE GREAT ICE-CUBE CAPER!
From P R. in B.C. "Yes, Bob, I tried your simulated hail test...I dug 2 dozen ice cubes out of my little propane refrigerator...and carried them outside to where I had your hapless sample of plastic tucked into an old window frame. Well, I commenced to hurl ice cubes at that pitiful petroleum product and you know, it held up just fine. As the cubes melted in my hands with each succession, I was able to simulate smaller hailstones. Some of my neighbours happened by, but quickly left, ignoring my invitation to stay and throw a few hailstones at the plastic!" - P.R., British Columbia

WOVEN POLY ATTACKED BY WEIGHT LIFTER!
"Dear Bob, Great stuff. Several full-grown men have tried to rip, from a hole I cut into it, this sample in half. Completely unable to, until a 16 yr. old took his weight bar and a convenient bed post and scissored (himself) between the bed post and the weight bar and with disbelief on our faces (he) proceeded to lift the bed off the floor. Two of us and his full strength finally shredded one tiny sample. Great stuff. Send me 55 feet of it (55' by 10')...as quickly as you can. Yours truly, R.E.P." - California

WOVEN POLY PROTECTS TOMATOES FROM HORRENDOUS HAIL STONES!
I've received dozens of fascinating phone calls from customers, but the one from Everett W. in Nebraska was hard to believe. So I asked him to write a letter and I quote from it now: "In June (1982) we had a terrible hail storm with hail golf ball size and a few baseball size which lasted 20 to 30 minutes. This was a real test for the woven poly that we had purchased from you earlier and put on a 20' by 40' greenhouse for tomatoes. The hail storm damaged all the roofs on houses in this area and (they) had to have new (roofs) -- the hailstones were beat into the ground 4 to 6 inches in places -- ruined all our garden except what was covered with pails etc. -- and it broke out the solar panels in our solar greenhouse...that has 1/8 inch Acrylite panels -- but the woven poly on the greenhouse framework had a few punctures holes in it (about the size of quarters)...could hardly believe how well it stood up (not a plant was damaged). The small punctured holes I shall repair. The storm...was a direct hit for the greenhouse. I would recommend this (poly) for the best hail insurance and the cheapest one can buy for a greenhouse crop. We just harvested 220 lbs. of tomatoes with more to come -- we sell at a farmer's market and locally. The tomatoes have done beautifully with this woven poly covering." - E.W., Nebraska

He told me that the insurance company paid him $4000 for damage to his house and attached structures. The hail was two feet deep behind his greenhouse. A high school was impressed by the protection and later ordered some woven poly from me. But... hail never strikes twice in the same place, does it?

PHOTOS AND CUSTOMER COMMENTS

"TREE MEETS GREENHOUSE - GREENHOUSE WINS"

"I purchased the greenhouse strong poly in 2004 so here it is 8 years later and to my dismay we just had an almost complete failure. I looked back at the paperwork and you have a full sheet stating on how the poly will self destruct if it is not installed correctly. But in the warning sheet it stated nothing about 80' pine trees! We had high winds that blew over an 80' pine tree that crashed right through the center of the greenhouse. We put our tropical plant in the greenhouse during the winter and if it weren't for your poly we would have lost our Hawaiian Lei (plumeria). Even though the tree was rotten it was still solid and I could not believe that the plastic caught it. It did bend the frame so I will need some more sections Also you might want to warn others that just because it caught this tree it might not catch all of them.
Calvin from Jacksonville, FL

"WHY 5 SIDES? WHY NOT? EVERYTHING I EVER BUILT BEFORE ONLY HAD 4 SIDES!"

"The material you supplied me in 1985 stood up well until two years ago. Since then I've done a lot of patching and siliconing It is now (March 1994) beyond repair. Our little greenhouse has provided us with the earliest tomatoes in the district--usually by mid-June, and last year the only tomatoes we had. I have 10 washing-machine-tub planters inside-- by midsummer it becomes a jungle. Most of my container gardening information has come from material you sent us in 1985. I still use outdoor tire planters for the cucumbers and outdoor tomato plants." "B" from SASKATCHEWAN

'B' (SASKATCHEWAN) WORKING ON HIS GREENHOUSE WHICH HAS 5 SIDES."

COMPOSTING MY CATALOG?

Dear Bob & Marg, You are the people I've been looking for...! Those who don't have $2000 for a beautiful add-on greenhouse, who listen to others, no glossy catalogue-- (I can compost it when I get a new one), and you obviously include the family in your work. And I know I can ask for advice (I'm a long-time gardener, but this is my first greenhouse!), so, thank you! Here's my order & wish me luck!
- Sincerely, B L, Wyoming

PLEASE SEND YOUR PHOTOS & LETTERS!

In addition to the word of mouth advertising, we also appreciate the testimonials and photos that you send to us for future catalogs and newsletters. To put it mildly, I am crazy about the structures my customers build. I know so because they send me pictures. They are each different, and most are lovingly constructed, and come with a story to share. These greenhouses seem so filled with the greenery and abundance of plants. Send me your pictures! I never throw them away, I treasure them. I look at them constantly. ***Thank you, fellow growers; you are amazing people!***

PS If you are willing, please include a letter giving us permission to use your comments and pictures in our catalog and website. Please tell us which pictures or comments we can & can't use and what you would like to be called when we do (eg Bill & Joan from Washington or B & J from Manitoba). *- Thanks! Bob & Margaret Davis*

Prices: See Pages 4-5 ***Ordering Information: See Pages 30-31***

MORE CUSTOMER COMMENTS

MARKET GARDENER PREFERS REBAR GREENHOUSE OVER COMMERCIAL ONE I am going to be building a rebar greenhouse to use to start plants for our organic market garden business next spring.....A friend of ours recommended your polyweave and rebar design. She has been running a small organic market garden specializing in greens to restaurants. Her first greenhouse was a rebar home-built job. She then got fancy and bought a $6000 pre-fab unit which she say is "garbage" and not worth the price! ... Anyway, loved your "folksy" brochure and look forward to hearing from you soon. Doug, Ontario, Nov. 95

Bob comments: I like many of the commercial greenhouses, but if I had waited till I had the cash to buy a fancy one, I may never have started in greenhousing. I also drive an older pickup for the same reason: it costs less and it still gets me there!

OUR POLY COMPARED TO ANOTHER POLY ON CALIFORNIA GEODESIC DOME After 4 years of exposure to the sun and the heat of the Sacramento Valley, I am recovering sections of my greenhouse (but only the parts that get direct sun). Another tribute to the durability of your plastic came during a hailstorm a few months back. I had used another type of plastic in part of the greenhouse because it is clear, and I wanted a "window." This other plastic was 20% thicker than yours and twice as expensive. Anyhow, the hail shredded that plastic, but didn't make a single hole in yours. Since I have to replace the other stuff, I figured I'd also replace some of yours, which while it is still intact is starting to show some wear at points where it is stapled to the wooden struts. ... my greenhouse ... is a slightly modified geodesic dome, about 10 feet in diameter. It is built with 2x2 redwood struts and some pretty simple hardware to connect them. ... It is based on (the) book Building and Using a Solar Heated Geodesic Greenhouse by John Fontanetta and Al Heller. ... Geodesic domes are the most efficient structures known, in terms of strength to weight and enclosing the most space with the least materials. David, California

THREE FEET OF QUEBEC ICE AND SNOW BEND 3" PIPES; PLASTIC HOLDS The pictures attest to the exceptional strength of the greenhouse (woven) plastic during the ice storm, which we have had here in Quebec. (3 feet of ice and snow). As can be seen the steel (3" steel pipe) and wood structural support bent and broke under the weight load of snow and ice - but not the plastic. The holes in the plastic were pierced by steel and wood, as a result of the ice weight on the structural breaking points. I do hope this will help in the attestation for the quality of woven plastics. Sincerely, E.R.F, Quebec

SURVIVING SIX INCH SLIPPERY SLUGS AND WILD WINTER WINDS Bob… this is the second time I have ordered your greenhouse plastic, the plastic lasted longer than the wooden frame did, it was destroyed in a 100-mph gale two years ago. I salvaged the plastic and will use it in raised beds in my new greenhouse. My new greenhouse is a 16' x 34' structure made with metal greenhouse bows made here locally, and metal fence posts, while not as inexpensive as your rebar design it is very strong. I first heard of your product from a friend who has bought a lot of plastic from you. Gardening on the California North Coast can be quite a challenge due to the wind, low summer temperature, and pests especially large (6") slugs that can destroy a newly planted garden overnight. Having a greenhouse is the only way to go in this area. I'll pass on the info to other folks in the area thanks. - Donald, California

PLASTIC STILL SURVIVING 10 YEARS OF WILD ALASKAN WINDS, WINTERS. I purchased some "clear" woven poly over 10 years ago and am so thankful that you are still in business! I don't need to replace what I originally purchased; I need more for a different project. I have used it for row covers, windbreaks and cold frames. We live in southeast Alaska, on the coast. It has withstood harsh winds, winter temperatures to -10°F, salt spray, and long hours of summer sunshine (in between copious amounts of rain). It's wonderful stuff. I'll keep spreading the news! Sincerely, Chris, Alaska

PORTABLE POULTRY PASTURE PENS Last year you sent me some of your 12 mil black/silver woven poly. It has performed great in a unique (?) application. I have been raising broiler chickens in portable pens (10'x12') which move across the pasture. Normal galvanized, corrugated metal roofing was too heavy (for portable pens). Handling, cutting, and attaching were greatly simplified (over metal). - K and M, Kansas

FIVE YEARS OF "WEATHER ATTACKS" AND 17 SNOW STORMS IN FOUR MONTHS! Incidentally, the 9 mils poly I ordered in 1990 for my greenhouse has held up fantastic. No nicks, tears, slits, etc. and the sunlight/snow/cold temperatures don't seem to have made any inroads in deterioration; surprising after the 1993/94 winter when we had 17 back-to-back snowstorms from December through March ... we got buried in snow. The summer of 1994 was awful ... one of the hottest on record for New Hampshire; this year is shaping up to be a repeat of last summer! But nothing seems to phase the poly ... just hope it holds up another 5 years! Keep up the good work! July 1995. Doreen, New Hampshire

HUMANE SHELTER SAVES MONEY ON HEATING AND PROTECTS THEIR ANIMALS' HEALTH USING OUR WOVEN POLY AS A WINDBREAK ON PENS & RUNS.
(24 mils would also work well for this. Bob) This will confirm my ... new order for 100 linear feet of 12 mil translucent ... As I mentioned, the (poly) is used as a windbreak around our exterior dog runs, and freestanding pens. It is cut into 12-foot long pieces, approximately 65 to 72 inches high. Across the top and bottom, we set hardware store grommets ever 18 inches to give us fastening points. The pieces are a reasonable size for one man to handle. ... The ability of the 1993 polywrap to stand up to the weather has been very gratifying. So far (in three years' use) the sun's ultra violet rays have caused no brittleness. Except for a little more cloudiness and some edges where the dogs have chewed at it, there is little wear and tear.It has helped reduce our heating bills and contributed quite a lot toward keeping the animals healthy. Here in New Jersey the daily winter temperatures bounce from about 40 degrees (daytime) to 20 degrees at night. ... The society anticipates that after we get our new order we should be set for about five years of service out of the new order and two more years out of the "93 fabric. - John, New Jersey

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ANY QUESTIONS OR COMMENTS TO BOB OR MARGARET? Write us a letter with lots of blank spaces between questions for each answer & enclose a self-addressed stamped envelope, or fax, or phone or email. - Bob & Margaret Davis

PHOTOS AND CUSTOMER COMMENTS

J'S REBAR GREENHOUSE SURVIVES NEAR BRUSH WITH TEXAS TORNADO.

"...the greenhouse I built by myself with no help. It's 10 x 20 with your poly on it ... It withstood an 85-mile wind. We had a tornado here just 5 blocks from my greenhouse ... It took it like a charm. I plan on adding another 20 feet to it this summer." - J.M., Texas.

OUR SUPERSTRONG WOVEN POLY OUTLIVES GREENHOUSE FRAME IN FLORIDA HURRICANE. In January 1994, Paul phoned to say that they had gone through a hurricane that destroyed their greenhouse, but that our superstrong woven poly survived the destruction of the frame and stayed in one piece, so they built a new greenhouse and attached their used superstrong woven poly onto it. He told me that they put the poly onto the greenhouse on the 4th of July 1990, so it was over three years old at the time of the storm. - Paul, Florida

D'S GREENHOUSE SURVIVES 100 mph RHODE ISLAND HURRICANE.

D.N. (age 72) says, "Hi Bob & Margaret, I'm writing to tell you that my greenhouse came through the winter with flying colors. We had a hurricane in late August and your polyweave stood up to 100-mi. winds. Also my male cat Topsy has been climbing on top and sleeping there.... I am very pleased with it...Send me a flyer every now and then...in case someone wants the poly--I can give them your address. With many thanks" - D.N., Rhode Island

BIRDS, CATS, KIDS, DIVE-BOMB 6 MIL POLY, OWNERS SWITCH TO OUR POLY.

"Bob's superstrong plastic is exactly what I have been looking for...I (originally) used 6 mil construction plastic on the greenhouse. Within 2 weeks I had two tears from birds flying into it, and numerous holes & snags from cats & kids...(Then) we found a grower who sold us white greenhouse plastic. (Their) white plastic didn't last much longer than the clear stuff & it has about 4 patches in it now. Your plastic is perfect--a dream come true! Maybe this year I can spend more time planting and less time patching. Please send me 250 sq.ft. of 12 mils poly (&) 1 roll cinch." - L.E., Ontario

JOINING REBAR RODS TO MAKE LONGER RODS

"A couple of ideas on the frame construction," Bill writes. "Instead of buying one-piece rebar rods or welding the pieces together you can use a piece of conduit as a sleeve to hold two short pieces together. A piece about 1 foot long works well. Just use the next bigger size conduit than the rebar you use. You can hold the joint together with tie wire or grey tape."

DOUBLE POLY ON A REBAR GREENHOUSE

"To make a double-layered rebar greenhouse, use 1x2's to fir out the inside walls. They can be held in place by tie wires using a saddle tie so that the wire forms an X on both the top and the bottom. Twist wire tight on the side of the pieces so that wire end does not pierce plastic. Greenhouse can then be inflated by use of a vent and small fan." "Keep it up." -- "Bill," Lump Gulch Organics, Colorado.

IF YOU WANT TO PASS OUR BROCHURE ON TO OTHERS JUST CALL, WRITE OR EMAIL TO ASK FOR A FEW EXTRAS. THANK YOU FOR HELPING TO SPREAD THE NEWS! - BOB & MARGARET

Prices: See Pages 4-5 *Ordering Information: See Pages 30-31*

PHOTOS AND CUSTOMER COMMENTS

"ANGLE IRON J'S" SKYWALK IN WASHINGTON made of OUR SUPERSTRONG WOVEN POLY.

"Dear Bob, This is my third order for your super plastic. I have used your plastic for my greenhouse... Now I need a cover for a "sky-walk"--a covered walkway between two buildings. It is going to be a real doozie!"

...Two months later (Jan.88) M wrote back, "Hi, Bob, Here are the pics I promised you of our "skywalk". If you have ever been to Spokane you will know why we call it that.

It is 30 inches wide and 24 feet long, giving us a covered walkway between my trailer and a shed. Then we go through J's machine shop, his trailer, down some steps and through a breezeway to the woodworking shop--all under cover... The plastic makes it nice and light in the tunnel, and the snow shakes right off. I really love the way this plastic diffuses the light--it cuts any glare and makes such a nice bright light... Oh yes, there is carpet on the floor of the tunnel, ...(which) keeps the plywood floor covered so it isn't slippery. The lower two feet is plywood, with angle iron bracing. (We call him Angle-Iron J.) Also angle iron support under the plywood floor. Sure is nice not to get your feet wet every time you want to go to the shop. Not to mention the slippery snow and ice. Was glad to get another brochure.--I give them away to anyone who is interested in a greenhouse. Till I need some more super plastic--keep up the good work." M & J, WA

Photos: (top) OUTSIDE OF "SKYWALK"
(left) 'M' IN "SKYWALK"
(right) 'J' (THE BUILDER) IN "SKYWALK"

USES POLY TO LINE WATER TANK.

"Your poly along with others has been sitting in water for over 2 years; the others rotted or separated and yours is as good as the day we inserted it; WELL DONE."
- B.K., British Columbia

PHOTOS AND CUSTOMER COMMENTS

J & A Sailing with PAINTED POLY SAILS

J & A of British Columbia, used our extra heavy woven poly to make traditional Chinese Junk style sails for their 29' sailing dory. He painted the panels black, red, and yellow.

Be sure to check out our online customer gallery too!

LIGHT TRANSMISSION GREAT. "I have experienced excellent results with your plastic poly. In fact, light transmission is so good that shading is necessary in summer." - M.R., Texas

SMOOTH SAILING for STEVE'S SHARP SLEEK 20' X 36' BOAT SHED (UNDER $600)

Dear Bob, You said "keep smiling," well, you'd better believe I am. Your woven poly is the best boat-shed material I've ever found! Besides undercutting the competition by a mile in terms of price, it is stronger and longer lasting and should hold up to our Maine winters just fine. We built the shed using 1" x 3" strapping, to provide a good work space 20' x 36' for the restoration of a 1924 gaff rig sailboat, a 2-3 year project. The building has cost us under $600 including ventilation & electrical wiring, and the environment inside is perfect for working with stable temperatures & wonderful light. I'm telling other boating enthusiasts. You've got a fan club in Maine. Thanks. - Steve, Maine, August 1993

HURRICANE ANDREW MEETS HIS MATCH !

"My acquaintance and friend N. M. ordered fabric from you 7 or so years ago. Your fabric on his greenhouse, when the fabric was 4 or 5 years old, went through Hurricane Andrew, no problem. Anyway, I think I want to copy his design and use the same fabric." GLENN from LOUISIANA

Prices: See Pages 4-5 *Ordering Information: See Pages 30-31*

ORDER FORM

To Order Again or to get Future Ordering Help or Ask Questions, Phone, Fax, Email, or Write us.

Order Date	Shipping Date	PAID ☐ COD ☐	Inv #

UNITED STATES of AMERICA

Northern Greenhouse Sales Inc.
Box 42,
Neche, ND 58265 USA

In USA, we charge 15% (minimum $15) shipping. UPS can take up to 147 lbs or 3400 sq.ft. of 11 mils woven poly per box. USPS (mail) can take up to 1500 sq.ft. 11 mils woven

CANADA

Northern Greenhouse Sales Inc.
Box 1450,
Altona, MB R0G 0B0 Canada

In Canada, we charge 17% (minimum $17) shipping. Each Canada Post carton can take up to 1500 sq.ft. of 11 mils woven poly per carton.

Cartons that are too heavy for Mail or UPS will have to go by prepaid freight. Call us for freight info & quote. Tel 1-204-327-5540

We need your mailing & ups addresses, phone # (+ freight address if individual pieces too heavy per carton) revised Dec. 31, 2016

Name _____
Company _____
Address _____

City or Town, State or Prov. _____
ZipCode or Postal Code _____
Phone # _____ Fax # _____ Email _____

Mils, Color	Woven Poly	$ TOTAL	
_____	____FT x____FT =____ SQ.FT. X ___ pcs=____ SQ.FT. X ____ C PER SQ.FT.		
_____	____FT x____FT =____ SQ.FT. X ___ pcs=____ SQ.FT. X ____ C PER SQ.FT.		
_____	____FT x____FT =____ SQ.FT. X ___ pcs=____ SQ.FT. X ____ C PER SQ.FT.		
_____	____FT x____FT =____ SQ.FT. X ___ pcs=____ SQ.FT. X ____ C PER SQ.FT.		
_____	____FT x____FT =____ SQ.FT. X ___ pcs=____ SQ.FT. X ____ C PER SQ.FT.		
Tarps: Phone before ordering.			

NAME OF PRODUCT	QUANTITY	PRICE EACH		
CINCHSTRAP (lath) (100 ft per roll)	rolls			
POLYFASTENER (100 ft per roll pf)	rolls			
POLYFASTENER (300 ft per roll pf)	rolls			
Heavy-duty Roller Tool				
		SUB-TOTAL		

Shipping in the USA for most orders under $100 is $15. For orders over $100, Shipping is 15%
Shipping in CANADA for most orders under $100 is $17. For orders over $100, Shipping is 17%
Shipping Exceptions: Phone us re: Alaska, Hawaii, Puerto Rico, Yukon, Nunavut, NWT for a quote

	eg. 15% x $200 = $30	
SHIPPING		

Weight	Parcel Dimensions - Warehouse staff fills in			
	THANKS!	**SUB-TOTAL**		
		All Canadians pay HST or GST, as below: NB, NS, PE, NL **15%** MB, ON **13%** AB, BC, SK, NT, NU, QC, YT **5%** GST# 11688 0212 RT 0001 **USA 0%**	GST/HST	
		North Dakota residents only **5% NDST**	NDST	
		TOTAL		
		Ship Via: **PAID ☐ COD ☐**		

Please tell your friends & neighbors about our plastic!!! This will help us hold down prices. Advertising costs lots, so we rely on your comments to others in your local area! ***Thanks! Keep smiling! Bob & Margaret Davis***

Come See Our Website! **www.northerngreenhouse.com**

CONTACT INFORMATION

Phone 1-204-327-5540 - 6am - 6pm Central Time
Let it ring about 12 times in case I'm in greenhouse.

Fax 1-204-327-5527
We respond to faxes faster than emails.

Email: info@northerngreenhouse.com
(Nice for complete correspondence trail)

Visit: www.northerngreenhouse.com

UNITED STATES of AMERICA

Northern Greenhouse Sales Inc.
Box 42,
Neche, ND 58265 USA

CANADA

Northern Greenhouse Sales Inc.
Box 1450,
Altona, MB R0G 0B0 Canada

IMPORTANT ORDERING INFORMATION

- ☐ **Take four key measurements. See page 3 - Calculating What Size Poly to Order.**
- ☐ **Order by phone, fax, mail, email. For all orders include**
  - ☐ **your name**
  - ☐ **phone number with area code, plus fax # if any, and email if any**
  - ☐ **complete mailing address (plus UPS address as well if in USA.)**
  - ☐ **a list including**
    - ☐ product name (p.2-9), thickness, color, (p.2), size (p.3) & price (p.4-5) of each item you're ordering
    - ☐ subtotal
    - ☐ postage/shipping
    - ☐ subtotal
    - ☐ taxes, if any, as per the information below
    - ☐ total
- ☐ **Please say where you saw our ad or heard about us. Also, we'd LOVE a photo of your greenhouse later!**
- ☐ **Use plain paper or the optional order form on page 30. If mailing or faxing, please print clearly or type.**

Payment Methods: COD or Prepaid by cheque or money order.
C.O.D. : Phone, fax, or email orders by COD, usually go same or next day by mail. If you don't hear back same day, phone to confirm that we got your fax or email. **COD Processing fee:** Canada $10, USA None . Shipping takes about a week.
Prepaid: Please enclose a money order or a personal cheque up to $500. First-time orders over $500 please use money order or certified cheque. Please ADD ON the SHIPPING &TAXES (see below). Thank you. Send your name, phone number, mailing address, & a list of what you are ordering, on p.30 order form or on plain paper.
On-line Ordering is now available on our website: www.northerngreenhouse.com

USA and CANADA – Shipping Costs and Sales Taxes

Shipping in the USA for most orders under $100 is $15. For orders over $100, Shipping is 15% of the product total.
Shipping in CANADA for most orders under $100 is $17. For orders over $100, Shipping is 17% of the product total.
Exceptions – shipping cost will be higher if any of the following apply, so phone us for info:
Phone us re freight by truck if the individual bundles are too heavy to go by normal shipping. See page 2 for poly weights.
Phone us re airmail, overnight, second day air, express post, and other faster, but more costly options.

USA – Normal Shipping: USPS (post office) or UPS – We try to ship within a day or two of receiving your order. From then it usually takes about 3-7 days (Alaska, Hawaii, Puerto Rico, may take longer).
Each USPS (US Postal Service) box can take up to 1500 sq.ft. 11 mils woven poly per carton.
Each UPS carton can be up to 147 lbs or a piece up to 3400 sq.ft. of 11 mils woven poly per carton.
Americans phone us re higher cost shipping for orders to Alaska, Hawaii, Puerto Rico, other remote areas.

USA Taxes – If you are shipping your order to North Dakota, please add 5% North Dakota State Tax.

CANADA – Normal Shipping: Canada Post Expedited Parcel – We try to ship within a day or two of receiving your order. From then it usually takes about 3-10 days (Yukon, Nunavut, NWT may take longer).
Each Canada Post Expedited Parcel can take up to 1500 sq.ft. of 11 mils woven poly per carton.
Canadians phone us re higher cost shipping for orders to Yukon, Nunavut, NWT, other remote points

Canadian Taxes – (GST #116880212) – All Canadians pay either GST or HST; Manitobans pay GST + PST.
Residents of NB, NS, PE, and NL, please add 15% HST to total price when ordering.
Residents of MB, please add 13% GST & PST to total price when ordering.
Residents of ON, please add 13% HST to total price when ordering.
All other Canadian residents please add 5% GST to total price when ordering.


Bob Davis
President &
Warehouse Manager


Margaret Smith-Davis
Vice-President &
Office Manager


Wilie Fehr
Poly Fabricator &
Lead Warehouse Man

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E-mail
and ONLINE!

Bob & Margaret Davis, Northern Greenhouse Sales Inc.
To get Catalog & Samples, just call or write & ask.
You can get a few extras for others too. Thank you!

Just Give Us a Call ! We're happy to help with product info and calculations !

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