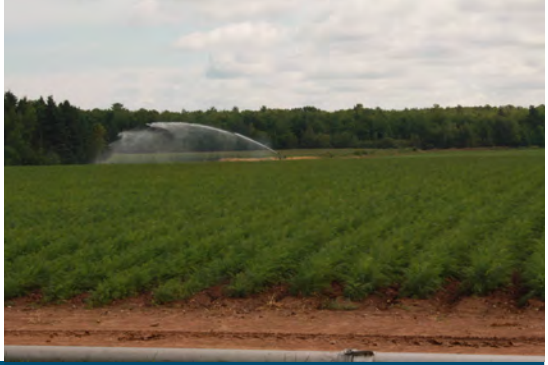
Extension and Advisory Team

Carrots Management Schedule

A guide to weed, insect and disease management in carrots in Nova Scotia

2018



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GUIDE TO PEST MANAGEMENT IN CARROTS

Nova Scotia Vegetable Crop Guide to Pest Management 2018
[CAR1-18]

Updated March 23, 2018 by
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IMPORTANT

This publication was compiled by representatives from Perennia using information from the Pest Management Regulatory Agency of Health Canada, specific pesticide labels, previous Atlantic Provinces Vegetable Pest Guides and manufacturer's information. **This information is continuously changing and therefore it can cease to be current and accurate. Pesticide labels are the best source of information and should always be consulted prior to using a product.**

By printing this publication, Perennia does not offer any warranty or guarantee, nor do they assume any liability for any crop loss, animal loss, health, safety or environmental hazard caused by the use of a pesticide mentioned in this publication.

WARNINGS

This publication is meant to be used as a reference for possible pest control options. Where there are multiple brand names of a specific active ingredient registered in Canada, Perennia has only listed a couple for reference purposes and as such does not endorse one brand over another. If you have purchased a generic product not specifically in this guide but has your crop and pest on the label, always follow that product label.

If any information in this or any other publication conflicts with the information on the label, always use the label recommendation. You are legally responsible for the safe use of pesticides you purchase. This means the safe transport and storage of these materials, the label rates used on crops, and the safe disposal of containers.

Pest	Group	Active Ingredient	Pesticide Product Name	Rate	Restricted-Entry Interval (REI)	Pre-Harvest Interval (days)	Remarks
WEEDS:							
Preplant *Perennial weeds including quackgrass*	14	Carfentrazone-ethyl	**Aim EC**	36.5-117 ml/ha	-	1	Apply in minimum spray volume of 100 L/ha. Refer to label for target weeds, buffer zones and rates. Use high flow rate nozzles to apply the highest spray volume.
	9	Glyphosate	**Roundup Original**	2.5-7.0 L/ha	12 hours	7	Apply in the fall or spring prior to planting. Annual weed control programs will be necessary to control weeds germinating after planting. For quackgrass control, apply to actively growing quackgrass when at least 4 new leaves are present. The low rate (2.5 L/ha) will provide a minimum of one season control, while higher rates (4.75 to 7 L/ha) will provide longer term control. The low rate of Roundup should be applied in 50 to 100 L/ha water. If higher water volumes are used add a suitable surfactant. Wait 72 hours before plowing under. Best control of quackgrass is obtained when these herbicides are applied in the fall.
			Roundup WeatherMAX	1.67-8.0 L/ha	12 hours	7	
			Touchdown® 480	2.5-7.0 L/ha	12 hours	7	
Stale Seedbed Technique	22	Diquat	**Reglone, Dessicash**	2.3-4.6 L/ha	24 hours	-	Apply before crop emergence to foliage of emerged weeds. Read label for water volumes required per hectare.
	10	Glufosinate ammonium	**Ignite® 15 Sn**	2.7-5.0 L/ha	-	-	
	22	Paraquat	**Gramoxone®**	2.7-5.5 L/ha	24 hours	-	
	6	Bromoxynil	**Pardner**	1.0-1.2 L/ha in 200-300 L water/ha	24 hours	45	***Apply only to carrots grown on muck soils containing greater than 10% organic matter.*** Apply 3-4 days prior to crop emergence by ground application only. One application per year. Do not irrigate carrots that have received a

							preemergence application of PARDNER for 2 days following application or within 3 days of crop emergence. PARDNER Herbicide is a contact herbicide thus good coverage of the weeds is essential.
Preplant Incorporated Treatments *Germinating annual grasses and some broadleaf weeds*	3	Trifluralin	**Bonanza 400**	2.0-2.75 L/ha		-	Lightly incorporate, 8 to 10 cm depth within 8 to 24 hours of application or up to 3 weeks before planting (Treflan), following label instructions. Ragweed and mustards are not controlled. Some crop rotation restrictions exist. Mineral soils only. Use in conjunction with a post emergence herbicide.
			Treflan EC	1.7-2.3 L/ha		-	
Preemergence Treatments *Annual Weeds*	7	Linuron	**Afolan F**	1.4-2.7 L/ha	-	-	Apply as a band or broad cast application after planting. Rain or irrigation is needed for good control. Additional postemergence treatments may be required. Should be applied soon after seeding. Use lower rate on sandy soils. Carrots are sensitive at time of emergence and heavy rains or irrigation following treatment may result in injury.
			Lorox DF	1.1-3.25 Kg/ha			
	5	Prometryn	**Gesagard 480SC**	3.75-4.58 L/ha	12 hours	85	Should be applied soon after planting. Do not use at or near time of emergence. Use low rate in sandy soils.
	3	Pendimethalin	**Prowl H_2O**	3.7 L/ha (mineral soil) 6.6 L/ha (muck soil)	24 hours	90	Apply within 2 days after planting and prior to the emergence of the crop and weeds. One application per year. Prowl H_2O will not control emerged weeds. Most effective when adequate rainfall or overhead irrigation is received within seven (7) days after application. Use a minimum of 200 L water per hectare. Do not apply in liquid fertilizers. Do not apply as a broadcast spray over top of carrots or crop injury may result. Do not apply to carrots grown for seed production.
Pre-emergent (after planting, prior to carrot	15	S-metolachlor	**Dual II Magnum**	1.2-1.5 L/ha	12 hours	30	Make only one application per year. Apply in 150 - 300L water/ha. Reduced levels of weed control may be observed when weed densities are high. Also controls night-

and weed emergence)							shades. Apply when crop is 3-5 leaf stage and weeds are prior to 2-leaf. Control of American nightshade, fall panicum, eastern black nightshade, foxtail (green, yellow, giant), crabgrass (smooth, hairy), old witchgrass, and barnyard grass and suppression of redroot pigweed.
Preemergence followed by Postemergence *Germinating annuals and emerged weeds*	7	Linuron	**Afolan F followed by Afolan F**	1.4-2.0 L/ha 2.0-2.7 L/ha	-	-	These treatments must be at least 2 weeks apart. See pre-emergence and post emergence remarks above. **If unusually heavy rains follow either application, sever injury may result**.
			Lorox DF followed by Lorox DF	1.1-2.25 Kg/ha 2.25-4.5 Kg/ha			
	5 7	Prometryn followed by Linuron	**Gesagard 480SC followed by:** **Lorox DF or/ Afolan F**	3.75-4.58 L/ha 1.1-3.25 Kg/ha 1.3-2.3 L/ha	-	-	On organic soils, a combination procedure which has been successful is to use the pre-emergence prometryn treatment followed by a post emergence linuron treatment as required.
Postemergence Treatments *Annual broadleaf weeds* *Annual grasses*			**Herbicidal Oil** **(Weedkiller No. 1)**	600-800 L/ha (overall spray) 300-400 L/ha (rows only)	-	30	Apply undiluted. Apply as soon as true leaves develop but before carrots are thicker than a pencil. Later treatments may result in an oil flavor in carrots. Weeds should be less than 10 cm high.
	1	Fenoxaprop-p-ethyl	**Excel Super**	0.67 L/ha		38	Apply when annual grasses are actively growing in the 1 to 6 leaf stage.
	7	Linuron	**Afolan F**	2.0-5.0 L/ha		-	Apply after carrots are 8 to 15 cm high. Temporary yellowing of carrot leaves may occur.
			Lorox DF	2.25-4.5 Kg/ha		-	
	15	S-metolachlor	**Dual II Magnum**	1.2-1.5 L/ha	12 hours	30	Make only one application per year. Apply in 150 - 300L water/ha. Reduced levels of weed control may be observed when weed

							densities are high. Also controls nightshades. Apply when crop is 3-5 leaf stage and weeds are prior to 2-leaf. Control of American nightshade, fall panicum, eastern black nightshade, foxtail (green, yellow, giant), crabgrass (smooth, hairy), old witchgrass, and barnyard grass and suppression of redroot pigweed.
Annual weeds including Scentless chamomile	5	Metribuzin	**Sencor 75 DF**	375 g/ha	12 hours		To be used only on processing carrots previously treated with preemergent application of linuron Herbicide (1100 g ai/ha; please refer to respective product labels). Apply when the fourth leaf is partially expanded on most carrot plants, followed by a second application, if necessary, when the fifth leaf is partially expanded (about 6 days after first application). Carrot varieties differ in their tolerance to SENCOR 75 DF Herbicide: growers should limit first use to a limited area of each cultivar before adoption as a field practice. It may be necessary to delay harvest of more sensitive cultivars treated with SENCOR 75 DF. Do not apply on coarse soils with less than 2% organic matter. Avoid application when carrots are under stress.
Annual broadleaf weeds less than 4 cm in height				190 g/ha			EARLY POSTEMERGENCE APPLICATION: Do not tank-mix with liquid fertilizers, oils, oil concentrates, or surfactants when applying postemergence because severe crop injury may occur. Do not harvest within 60 days of post-emergence application unless otherwise indicated. Thorough spray coverage on weed foliage is essential for adequate control with post-emergent applications.

							To improve coverage the spay boom may be rotated forward by 45°. SENCOR 75 DF Herbicide may be applied when crop is wet with dew, but weed control may be reduced if there is rainfall within 6 hours after application.
Quackgrass and annual grasses	1	Fluazifop-p-butyl	**Venture L**	0.60-2.0 L/ha	-	50	Apply when crop is 10 cm in height or less. Use the high rate for quackgrass control. Do not tank mix with other herbicides.
	1	Clethodim	**Centurion** **+ Amigo (adjuvant)**	0.125-0.19 L/ha Quackgrass: 0.38 L/ha 0.5% v/v Quackgrass: 1.0% v/v	12 hours	30	***To be used only with the adjuvant AMIGO.*** <u>Annual grasses</u>**:** Apply Centurion when the annual grasses and volunteer cereals are in the 2 to 6 leaf stage. Most effective control is achieved when application is made prior to tillering when grasses are small and actively growing. <u>Quackgrass</u>: Apply Centurion when the quackgrass is in the 2 to 6 leaf stage and 6 to 15 cm in height. Most effective results are achieved when application is made at the 3 to 5 leaf stage, when the canopy is uniform and actively growing. Apply a maximum of two applications per year. If repeat application is required, allow at least 14 days between first and second application. ***** *Refer to section "MINOR USES" in the label for additional use instructions.*

Pest	Group	Active Ingredient	Pesticide Product Name	Rate	Restricted-Entry Interval (REI)	Pre-Harvest Interval (days)	Remarks
INSECTS:							
Aphids	29	Flonicamid	**Beleaf 50SG**	0.12-0.16 kg/ha	-	3	Thorough spray coverage of plant foliage is essential. Minimum of 94 L water/ha. Maximum 3 applications per season, allow 7 days between applications. **Avoid overnight storage of spray mixtures, do not use liquid fertilizer as a carrier; do not use adjuvants.**
	4	Thiamethoxam	**Actara 25 WG**	105 g/ha	12 hours	7	Apply before pests reach damaging levels. Scout fields and treat again if populations rebuild to potentially damaging levels. Max of 2 app/season. Application interval: 7 days. Apply in sufficient water volume to ensure adequate coverage. Do not use less than 100 L/ha.
	4C	Sulfoxaflor	**Closer SC**	50-150 ml/ha	12 hours	7	Maximum 2 applications/growing season. Do not apply during crop flowering period or when flowering weeds are present in treatment area. Minimum treatment interval = 7 days. Minimum 100 L/ha spray volume for ground application.
Aster Leafhopper	1A	Carbaryl	**Sevin XLR**	1.25-2.5 L/ha	-	1	Apply when leafhoppers first appear and repeat when the Action Threshold is reached. Otherwise, apply at 7-10 day intervals until the end of Aug. or 20 days before harvest for early carrots. **Action Threshold: 5 leafhopper adults/25 sweeps.**
	-	Kaolin	**Surround WP**	12.5-25 kg/ha	-	-	**This is an OMRI listed control product and is suitable for organic production.** Apply in 500 L of water. Apply at 7-14 day intervals once initial infestation is detected. Use high rate for early applications. Do not exceed 25 kg/ha per application.

	4	Thiamethoxam	**Actara 25 WG**	105 g/ha	12 hours	7	Apply before pests reach damaging levels. Scout fields and treat again if populations rebuild to potentially damaging levels. Max of 2 app/season. Application interval: 7 days. Apply in sufficient water volume to ensure adequate coverage. Do not use less than 100 L/ha.
Carrot Rust Fly (Adult)	3	Cypermethrin	**Mako**	175 ml/ha in 550 L of water	12 hours	35	Do not apply more than three times per season. **Action Threshold: for fresh market carrots 0.1 flies/trap/day. For processing carrots, 0.2 flies/tray/day.**
			UP-Cyde 2.5 EC	280 ml/ha in 550 L of water			
	3	Lambda-cyhalothrin	**Matador 120 EC**	83 ml/ha	24 hours	14	Make first application at the 2-3 leaf stage when insects or damage appear. Timing of applications should be based on the presence of vulnerable pest developmental stages and significant populations as determined by local monitoring. Allow 7 days between applications**. Do Not apply more than 3 times per year.**
			Warrior				
Carrot Weevil	3	Lambda-cyhalothrin	**Matador 120 EC**	83 ml/ha	24 hours	14	Make first application at the 2-3 leaf stage when insects or damage appear. Timing of applications should be based on the presence of vulnerable pest developmental stages and significant populations as determined by local monitoring. Allow 7 days between applications**. Do Not apply more than 3 times per year.**
			Warrior				
	1B	Phosmet	**Imidan 70 WP Instapak**	1.6 Kg/ha	5 days	40	Use up to 1000 L/ha. Do not apply more than twice/year. Imidan should not be used on carrots that will be shipped to the USA either as fresh or processed. **Action Threshold: 1.5 - 5.0 weevils/trap, (cumulative value) spray at two leaf stage.**
	15	Novaluron	**Rimon 10 EC**	410-820 mL/ha	12 hours	3	*Reduces damage*. Apply at the listed rates when insect populations reach locally determined economic thresholds. Use the higher application rate when pest pressure is high. Apply in sufficient water volume to ensure thorough coverage. Recommended water volume is 500 litres of water per hectare. Apply at 7 day intervals. Maximum 3 applications.
Cutworms and Armyworms	1B	Chlorpyrifos	**Lorsban 50 WP**	2.25-4.5 Kg/ha	24 hours	60	Apply when cutworms are noticed. One application per season.
			Pyrinex 480 EC	2.4-4.8 L/ha			

			Warhawk 480 EC				Soil treatment: Apply once per season before planting or transplanting. May also be applied to a 15 m strip adjacent to fence rows. Use the low rate except under conditions of low soil moisture. Use the high rate if the top 1 cm of soil is dry. When preplant soil applications are being made to muck soil, do not incorporate. Incorporation on mineral soils should be no deeper than 5 cm. Seedling treatment: Apply as a broadcast spray at the 2- to 5-leaf stage. Use the low rate except under conditions of low soil moisture. Use the high rate if the top 1 cm of soil is dry.
	3	Cypermethrin	**Ripcord 400 EC**	175 ml/ha	-	35	Do not apply more than three times per season.
			Up-cyde	280 ml/ha			
	3	Permethrin	**Pounce 384 EC**	180-390 ml/ha	-	-	Apply up to 5 leaves. Applications should be made under warm, moist conditions in the evening or at night when cutworm activity is highest. Will only control surface feeding and climbing stages.
Diamondback Moth, Cabbage Looper, Imported Cabbageworm, Flea beetle	5	Spinetoram	**Delegate WG**	140-200 g/ha	12 hours	3	Time application with peak egg hatch or small larvae. Repeat applications based on population monitoring. Use higher rate for higher infestations or advanced growth stages. Maximum of 3 applications per year with a minimum re-treatment interval of 5 days. *For the suppression of **flea beetles** apply 200 grams of product per hectare. Apply when pests appear.

Pest	Group	Active Ingredient	Pesticide Product Name	Rate	Restricted-Entry Interval (REI)	Pre-Harvest Interval (days)	Remarks
DISEASES:							
Cavity Spot	4	Metalaxyl-M and S-isomer	**Ridomil Gold 1G**	25 Kg/ha	12 hours	-	Apply in the seed furrow at the time of planting. Make only one application per year. Refer to the label for further information.
	11	Fenamidone	**Reason 500SC**	600 ml/ha	48 hours	14	Make the first application within 7 days after planting. Apply in spray volume of 300-750 L/ha and direct spray to the base of the plant. Repeat applications should be at 7-day intervals. Max 2 applications per season.
Cavity Spot, Root Dieback/Forking (*Pythium spp*.)	21	Cyazofamid	**Torrent 400SC**	0.44 L/ha	12 hours	30	***Suppression only.*** Maximum of one application per season. Apply as either a post-plant, pre-emergent application within 3 days after planting or as a soil-directed spray 14 days after planting. Either application should be incorporated into the soil with 1.25-2.5 cm of water. See label for banding instructions. Do not apply in dead calm or when winds are gusty. Do not apply with spray droplets smaller than the ASAE medium classification.
Aster Yellows Disease							*** See Aster Leafhopper in insect section.**
Leaf Spots and Cercospora	11	Pyraclostrobin	**Cabrio EG**	560-840 g/ha	12 hours	3	Begin applications prior to disease development at 7-14 day intervals. Maximum of 2 sequential applications. Maximum total of 3 Cabrio and 5 Cantus applications per season. **See label for control of Alternaria*
	M	Chlorothalonil	**Bravo 500 / Bravo ZN**	2.4-3.2 L/ha	48 hours	2	Apply at 7 to 10 day intervals beginning when disease is observed. Do not grow carrots successively in the same field.
			Echo 90DF	1.3-1.8 kg/ha	48 hours	1	

	M3	Mancozeb	**Dithane DG Rainshield NT**	2.25 Kg/ha	-	7	
	M		**Penncozeb 75DF**	2.25 Kg/ha	24 hours	7	
	M		**Manzate Pro-Stick**	2.25 Kg/ha	-	7	
	11	Trifloxystrobin	**Flint**	140-210 g/ha	-	7	Begin applications preventatively and continue as needed on a 14-day interval. Use the higher rate and shorter spray interval when disease pressure is severe. Use sufficient water to obtain thorough coverage. DO NOT apply more than 840 g of FLINT Fungicide per hectare per season.
Alternaria	9-12	Cyprodinil & fludioxonil	**Switch 62.5 WG**	775-975 g/ha	12 hours	7	Maximum 3 applications per year. Allow 7-10 days between applications.
	7	Boscalid	**Cantus WDG**	315 g/ha	12 hours	0	Maximum of 2 sequential applications. Maximum total of 3 Cabrio and 5 Cantus applications per season.
	11	Pyraclostrobin	**Cabrio EG**	0.56-1.1 Kg/ha	12 hours	3	
	7	Penthiopyrad	**Fontelis**	1.25-2.25 L/ha	4 hours	0	**Begin applications prior to disease development, continue on a 7-14 day interval.** Use higher rate and shorter interval when disease pressure is high. Max seasonal rate is 4.5 L/ha. Do not make more than 2 sequential applications before switching to another mode of action.
	11	Trifloxystrobin	**Flint**	140-210 g/ha	-	7	Begin applications preventatively and continue as needed on a 14-day interval. Use the higher rate and shorter spray interval when disease pressure is severe. Use sufficient water to obtain thorough coverage. DO NOT apply more than 840 g of FLINT Fungicide per hectare per season.
	M	Chlorothalonil	**Echo 90DF**	1.3-1.8 kg/ha	48 hours	1	Apply in sufficient water to obtain adequate coverage. Use 1.3 – 1.8 kg in sufficient water to obtain adequate coverage. Start applications when disease threatens and repeat at 7 - 10 day intervals or as necessary to maintain control. DO NOT use more than 7 applications per season.
			Echo 720	1.7-2.2 L/ha	48 hours	1	Start applications when disease threatens and repeat at 7 - 10 day intervals or as necessary to maintain control.

Rhizoctonia Root Rot, Crown Rot and Stem Canker	11	Azoxystrobin	**Quadris** **Azoshy 250 EC** ***NEW 2017***	4-6ml of product/100 m row in 50-100L water/ha	- 12 hours	40	Apply either in-furrow at seeding or as a banded application over the row soon after emergence or within 30 days of emergence. Maximum 1 application per year.
White mould (*Sclerotinia sclerotiorum*)	-	*Bacillus subtilis*	**Serenade Opti**	1.1-2.2 Kg/ha	-	0	**Serenade Opti is a biopesticide that will only suppress the indicated diseases**. Begin application soon after emergence and when conditions are conducive to disease development. Repeat as necessary on a 7-10 day interval.
	12	Fludioxonil	**Scholar 230 SC**	496 ml / 378 L of water Treats up to 90,000 kg of carrots	-	-	Apply as a post-harvest dip or drench immediately before storage. Dip for approximately 30 seconds and allow carrots to drain. Maximum one application per year. Ensure Scholar solution remains in suspension by using agitation. Do not store carrots in direct sunlight. **MRL restrictions may apply to carrots sold outside of Canada.**
Gray Mold	7	Penthiopyrad	**Fontelis**	1.0-1.75 L/ha	4 hours	0	**Begin applications prior to disease development, continue on a 7-14 day interval.** Use higher rate and shorter interval when disease pressure is high. Max seasonal rate is 4.5 L/ha. Do not make more than 2 sequential applications before switching to another mode of action.
Powdery Mildew	7	Penthiopyrad	**Fontelis**	1.25-2.25 L/ha	4 hours	0	**Suppression only. Begin applications prior to disease development, continue on a 7-14 day interval.** Use higher rate and shorter interval when disease pressure is high. Max seasonal rate is 4.5 L/ha. Do not make more than 2 sequential applications before switching to another mode of action.

Use the following web link to search for any pesticide label mentioned in this guide, or any other pesticide registered in Canada:

http://pr-rp.hc-sc.gc.ca/ls-re/index-eng.php

PESTICIDE EMERGENCY CONTACT INFORMATION

Poison Control Centres		
Nova Scotia	800.565.8161 **or** 902.428.8161	IWK, Halifax, NS
New Brunswick	911	Ask for Poison Information
Prince Edward Island	800.565.8161 **or** 902.428.8161	IWK, Halifax, NS
Newfoundland	709.722.1110	Dr. Charles A. Janeway Child Health Care Centre, St. John's, NF

Environmental Emergencies (Pesticide Spills)	
Transport Canada Regional Operations Centre (24 hours)	
Nova Scotia	800.565.1633
New Brunswick	800.565.1633
Prince Edward Island	800.565.1633
Newfoundland	800.563.9089

ABBREVIATIONS & CONVERSIONS

Formulation and Measurement Abbreviations			
FORMULATIONS		MEASUREMENTS	
DF	Dry flowable	mL	millilitre
EC, E	Oil-based emulsifiable concentrate	kPa	kilopascal
EG	Water dispersible granule	kg	kilogram
F	Flowable	g	gram
G	Granule	L	litre
L	Liquid	BIU	Billions of International Units
WDG	Wettable dry granule	ppm	parts per million (1000 ppb)
WP, W	Wettable powder	ppb	parts per billion (1/1000 ppm)
WG	Wettable granule		
SC	Suspension concentrate		
Sn	Solution		

Helpful Conversions[1]	
kPa X 0.14 = pounds per square inch (psi)	millilitres X 0.035 = fluid ounces
hectares X 2.47 = acres	litres X 35 = fluid ounces
kilograms X 2.2 = pounds	litres X 0.22 = imperial gallons
kilograms per hectare X 0.89 = pounds per acre	litres per hectare X 14.17 = fluid ounces per acre
kilograms per hectare X 0.40 = kilograms per acre	litres per hectare X 0.40 = litres per acre
	degree-days C X 1.8 = degree-days F

[1] **Pesticide Units of Measurement**
It is not recommended to convert label rates to imperial units because there is a high probability of mathematical and rounding errors. Present day pesticides are formulated to be more effective in smaller amounts. Therefore, even small conversion errors can lead to the use of incorrect rates (either too high or too low). Use metric – you will be glad you did!