

HAND PLANTING TOOLS AND EQUIPMENT

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Abstract

This report reviews specifications, availability and costs of commercially-produced planting tools and equipment. Included are mattocks and hoes, spades and shovels, planting tubes, dibbles and hole pipes, planting bags and baskets, multipot carriers, and back-carriers. Some comments on usage are given. The report also includes a list of suppliers, with emphasis on those in central and eastern Canada.

Table 1 provides a list of Canadian distributors, with emphasis on those in central and eastern Canada.

Table 1. Suppliers of hand planting tools and equipment

Introduction

In 1986, there were about 575 million trees planted in Canada. Approximately 70% of these were grown in containers, and 30% as bareroot. In central and eastern Canada, an estimated 150 million seedlings were grown in multipots and 100 million in paperpots. Other container types such as Rootainers and Styroblock dominate in western Canada.

While there are only four major types of containers, several sizes of these are being used. Bareroot stock sizes also vary. A large selection of tools are available to plant this variety of seedlings. These tools are either sold commercially or are custom-made for an end user.

This report reviews the specifications, where available, of the commercially-produced tools and equipment with some comments on their use. The quality of the products has not been discussed since this is subjective and best judged by the user. Prices, as shown in the tables, are for a single unit only. This information has been provided by the respective suppliers and is subject to change without notice. Substantial quantity discounts may be available but are *not* shown here.

AM: A & M Steelcraft Ltd. 8250 - 124th street Surrey, B.C. V3W 3X9 (604) 594-0614	H: Hakmet Ltée Ltd. 881, Harwood Blvd P.O. Box 248 Dorion, Que. J7V 7J5 (514) 455-6101
CFE: Canadian Forestry Equipment, Ltd. 90E Brunswick Blvd Dollard-des-Ormeaux, Que. H9B 2C5 (514) 685-1100	KBM: KBM For. Consultants Inc. 360 Mooney Street Thunder Bay, Ont. P7B 5R4 (807) 344-0811
D: Dendrotik Inc. 3083, des 4 Bourgeois Sainte-Foy, Que. G1W 2K6 (418) 653-7066	NS: Nova Sylva Inc. C.P. 1624 Sherbrooke, Que. J1H 5M4 (819) 821-4617
FW: Forestworld Supplies Ltd. 304 East 1st Avenue Vancouver, B.C. V5T 1A9 (604) 875-1444	OSQ: Outillage Sylvicoles du Québec Inc. 1943, rue Principale St-Étienne des Grès, Que. G0X 2P0 (819) 535-3360
NOTE: Some of these companies maintain regional branch offices but these are not included here. For further details contact the suppliers shown in this table.	

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The survey encompasses tools for planting, equipment for carrying the plants while planting, and equipment for manual distribution of containerized seedlings. These have been categorized as:

I. Planting tools

- A. Mattocks and hoes (Table 2 and Fig. 1)
- B. Spades and shovels (Table 2 and Fig. 2)
- C. Planting tubes (Table 3 and Fig. 3)
- D. Dibbles and hole pipes (Table 4 and Fig. 4)

II. Carrying equipment

- E. Planting bags (Table 5 and Fig. 5)
- F. Planting baskets (Table 5 and Fig. 6)
- G. Multipot carriers (Table 5 and Fig. 7)
- H. Back-carriers (Table 6 and Fig. 8)
- I. Carriers for Roottrainers (Figure 9)

Note: The same tool may have alternate names in different regions and from different suppliers. For example, a mattock may be called a hoe, a planting spade may be referred to as a shovel, etc. Where the same tool is sold under different names, only the most common designation has been listed in the tables.

While the information on commercially-produced tools and equipment is accessible, this is not always the case with locally-made products. Details of these are difficult to track down and no such attempt was made for this report, though reference is made to some products.

I. Planting tools

The choice of planting tool may be based on several factors, e.g. type and size of planting stock, site conditions, personal preference, planting method, and company or government regulations. Some tools, like the dibbles, are designed for *a specific type and size* of container stock. Planting tubes can be used for *various types and sizes* of container stock. Spades and shovels, as a group, are the most flexible tools since they can generally be used for both container and bareroot stock. The same applies to mattocks and hoes which in addition can be used more easily than spades and shovels for manual site preparation or improvement to the planting spot.

A. Mattocks and hoes

Mattocks and hoes are available in different shapes and sizes (Figure 1 and Table 2). The smaller and narrower heads are used for container stock, while larger and wider heads are mainly used in bareroot planting. North American-made mattocks usually have a flat, or slightly concave, forged blade and curved (adze-type) handles. Mattocks of Nordic origin have a distinctly curved blade and a straight handle with a knob and small curve at the end.

Table 2. Specifications: mattocks and hoes; spades and shovels

Tool number and designation	Weight (kg)	Blade:		Handle:			Over- all length (mm)	Suppliers (see Table 1) and their list price per unit. (\$) [NOT including quantity discounts]								
		width (mm)	length (mm)	length (mm)	mate- rial	type ¹		AM	CFE	D	FW	H	KBM	NS	OSQ	
<u>A. Mattocks and hoes</u>																
A1. Planting hoe	1.5	125	210	830	Birch	S	915					21				
A2. Small planting hoe	0.9	85	140	550	Birch	S						18				
A3. Forged mattock	1.4	75	200	915	Hickory	Adze		36	48							
A4. Mattock; standard		85	220		Hickory	Adze					49					
A4. Mattock; narrow		43	220		Hickory	Adze					48					
A5. Planting mattock	1.6				Hickory	S			21							
A6. Planting hoe	1.4	76	203	915					34							
<u>B. Spades and shovels</u>																
B1. Treeplanter spade (GTP-11)	2.2	125- 80	280	830*	Ash	D*/T/S	1110*		47	34	34	38	34	38	38	
B2. Spade, (GDS-14)	2.0	140-110	355	705	Ash	D	1060		36	34	40	38		38	38	
B3. Spade, (BDDS14)	2.1	110	180	630	Ash	D	990						31			
B4. Spade, (GGS2)	1.9	180	240	630	Ash	D	940						29			
B5. "L-cut" spade		190	255		Ash	D/S					34	34		40		
B6. Speed spade		100- 75	230		Ash	D/S					36	38				
B7. Spear	1.6	80- 40	200		Ash	D/T/S			56		40	40	40	52		

1 D = D-type handle; S = Straight handle; T = T-type handle; Lengths may vary between suppliers.

* Refers to D-type handle.

Note: Forged mattocks, hoes, spades and shovels are made by a limited number of specialized manufacturers on behalf of larger tool companies and suppliers who then sell the tools under their own name. Thus, similar tools with different names may be made by the same manufacturer.

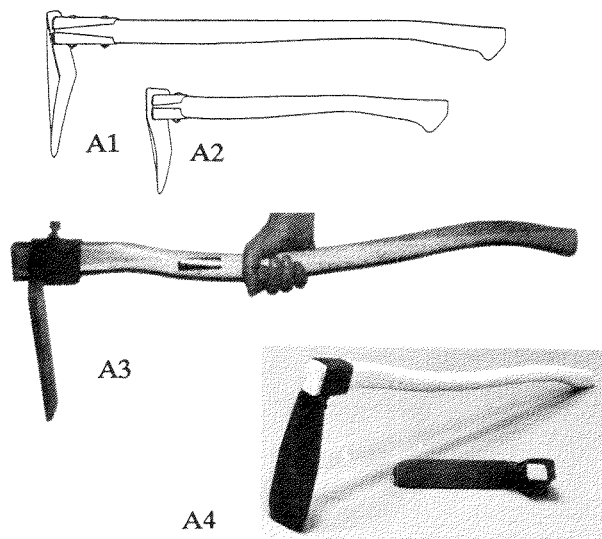


Figure 1. Mattocks and hoes. (Tool numbers in figures correspond to those in appropriate specification tables).

Mattocks and hoes are versatile and inexpensive tools, most suitable where manual site preparation or micro-site improvement is required before planting. They are often the preferred tool in steep terrain, rocky sites or in clay soil. Among the disadvantages are the fact that the blade must penetrate the ground at a perpendicular angle to insure proper seedling placement. This is made easier if the blade is at a right-angle to the handle. The soil must be carefully packed around the roots to eliminate air pockets. Planting and site preparation with mattocks and hoes are fatiguing because the arms and upper body do most of the work; though using proper work techniques will help to alleviate this problem. Working in heavy brush or slash may be difficult since swinging the tool is then restricted.

The popularity of the mattock has declined in recent years, partly as a result of new spades becoming available and partly because of the increased use of mechanical site preparation.

B. Spades and shovels

Spades and shovels are perhaps the most common planting tools used. Like mattocks and hoes, they come in a variety of sizes and shapes (Figure 2 and Table 2) for use either with bareroot seedlings and transplants, or with container stock. The blades may be flat or concave, with round, slightly-pointed or square edges. All have step-plates welded above the blade. Rubber pads are sometimes riveted to the step plates.

Planting shovels and spades are rugged, versatile planting tools which are easy to handle in areas with heavy brush or slash. They are less fatiguing than mattocks since much of the work is done with the legs and the weight of the body. The best efficiency is achieved in

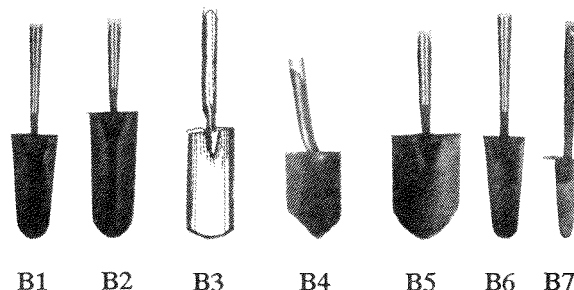


Figure 2. Spades and shovels.

deep, loose soils. The wider blades may not penetrate well in shallow, rocky or heavily-rooted soils.

Included under spades and shovels in Table 2 is the planting spear (Tool #B7) which was developed in British Columbia. It has a narrow blade best suited for container stock and it will penetrate easier between obstacles such as roots and rocks. The problems of glazing and compaction of the surface of the cavity, associated with dibble-style tools, are limited to one side of the cavity. The suppliers claim that the spear is suitable for all soil types and site conditions.

Different styles and lengths of handles are available for mattocks, hoes, spades, shovels and spears as indicated in Table 2. Suppliers indicate that there is a trend towards the use of straight handles. This type of handle allows the hand to slide if an obstruction is encountered during insertion of the tool. The hand is also in its optimal position to withstand forceful impacts and thus the risk of injury is reduced.

C. Planting tubes

Planting tubes, unlike all other planting tools, allow the planters to work in an upright position, which reduces the back problems normally associated with tree planting work.

The Pottiputki planting tube (Figure 3 and Table 3) is a well-known tool developed especially for the planting of paperpot containers. It can also be used for certain other container types. The standard Pottiputki is available in four diameters to match the size of the containers to be planted. In 1987, the manufacturer introduced a redesigned closing system which will be standard henceforth. All models are available in steel.

Table 3. Specifications: planting tubes

Tool number and designation	Manufacturer	Weight	Length	Available sizes (Inside tube diam.)	Suppliers (see Table 1) and their list price per unit. (\$) [NOT including quantity discounts]								Comment
		(kg)	(mm)	(mm)	AM	CFE	D	FW	H	KBM	NS	OSQ	
C. Planting Tubes													
C1. Pottiputki	Lannen Tehtaat OY	2.5-3.3	930	38, 50, 63, 70					110				(1)
C2. Planting tube	Svedbro Smide AB	2.3-3.1	950	40, 50, 60, 70		99				99	106		(2)

(1) Other models available: Steel tubes with long jaws; aluminum tubes (50-mm only) with standard jaws; steel tubes with reverse-opening jaw.
Prices shown applicable only to 50-mm standard steel model (old or new version, depending on supplier).

(2) Other models available: All sizes available with plastic tubes; size 50 available with 40 mm longer jaws and total length of 970 mm. Available on special order: short model (840-mm); left-handed model.
Prices shown applicable only to 50-mm standard steel model (old or new version, depending on supplier).

NOTE: Both planting tubes have recently been improved to correct earlier problems. However, older models are still on the market. Prices may differ between versions.

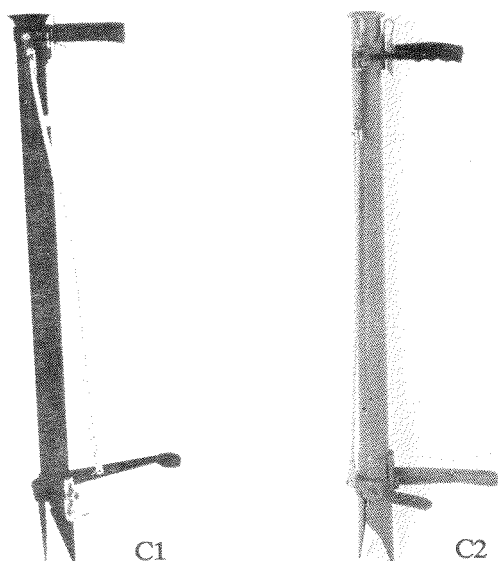


Figure 3. Planting tubes.

Some 50-mm diameter aluminum tubes are also available. Longer jaws are optional on the steel models, but only standard-length jaws are available for the aluminum tubes. Another option provided for the steel models is a reverse-opening jaw that opens towards the planter. Since soil is loosened by the jaw that opens, this permits packing around the seedling with the toe rather than the heel of the boot.

The Svedbro planting tube (Figure 3 and Table 3), made in Sweden, will soon be available on the Canadian market. It is very similar to the Pottiputki and is also made in four tube diameters. It has replaceable jaws and the most commonly-used size, the 50-mm diameter, also comes with jaws that are 40 mm longer than the

standard. The three smallest sizes (40, 50 and 60) are available with the tube made of either plastic or steel, while the biggest model (70) is only made with a plastic tube. The plastic models are 0.4 to 0.6 kg lighter than the all-steel planting tubes.

D. Dibbles and hole pipes

Dibbles (Figure 4 and Table 4) are often used to plant multipot and styroplug container seedlings. The size of the dibble tip closely matches that of the container. The dibble tip is solid and thus displaces the soil in the cavity. This may cause unacceptable compaction in heavy or very wet soils. Compaction, which is most serious in clay soils, restricts root growth and contributes to frost heaving. However, the snug fit obtained with dibbles eliminates air pockets that can damage the roots.

Hole pipes (Figure 4 and Table 4), sometimes referred to as carrot extractors, are essentially the same as dibbles but with a hollow tip which allows the soil in the cavity to be removed rather than displaced. However, the hole may clog up in some conditions and the hole pipe then works like a solid tip dibble. This problem is reduced with tools that have thin walls (<2.0 mm) and an even taper on the inside and outside surfaces of the tip.

Some dibbles are made with replaceable tips which allow the same basic tool to be used for different sizes of containers. Dibbles and hole pipes are often locally manufactured, but then mostly without replaceable tips.

Handles for dibbles and hole pipes that are made of steel easily transmit impact shocks to the hand. Some dibbles and hole pipes (D1-D4) are made with a shock absorbing rubber damper between the tip and the handle. As with spades and shovels, a straight handle will also reduce impact shocks to the hand.

Table 4. Specifications: dibbles and hole pipes

Tool number and designation	Container type	Type of tip	Replace-able tip	Includes scarifying blade	Overall length ¹ (mm)	Suppliers (see Table 1) and their list price per unit. (\$) [NOT including quantity discounts]							
<u>D. Dibbles & hole pipes</u>						AM	CFE	D	FW	H	KBM	NS	OSQ
D1. Nova Sylva dibble	Multipot 45	Solid	Yes	No	1000					38		40	
D2. Nova Sylva dibble	Multipot 67	Solid	Yes	No	1000					38		40	
D3. Nova Sylva hole pipe	Multipot 45	Hollow	Yes	No	1000					40		40	
D4. Nova Sylva hole pipe	Multipot 67	Hollow	Yes	No	1000					40		40	
D5. Garant dibble	Multipot 45	Solid	Yes	No	D-850; S-1220		*75	44		*74		44	42
D6. Garant dibble	Multipot 67	Solid	Yes	No	D-850; S-1220		*75	44		*74		44	42
D7. O S Q dibble	Multipot 45	Solid	No	No									40
D8. O S Q dibble	Multipot 67	Solid	No	No									37
D9. O S Q hole pipe	Multipot 45 & 67	Hollow	No	Yes									42
D10. Scarifier/dibble	Multipot 45 & 67	Solid	Yes	Yes	Adze			52					42
D11. Dibble	Styrobloc 211	Solid	No	Yes	D-830; S-1340	32	76		50				
D12. Dibble	Styrobloc 313	Solid	No	Yes	D-850; S-1360	34	80		50				
D13. Dibble	Styrobloc 4	Solid	No	Yes	D-860; S-1370	38	86						

1. D = D-type handle; S = straight handle. Lengths may vary between suppliers.

* Includes tips for both Multipot 45 and 67.

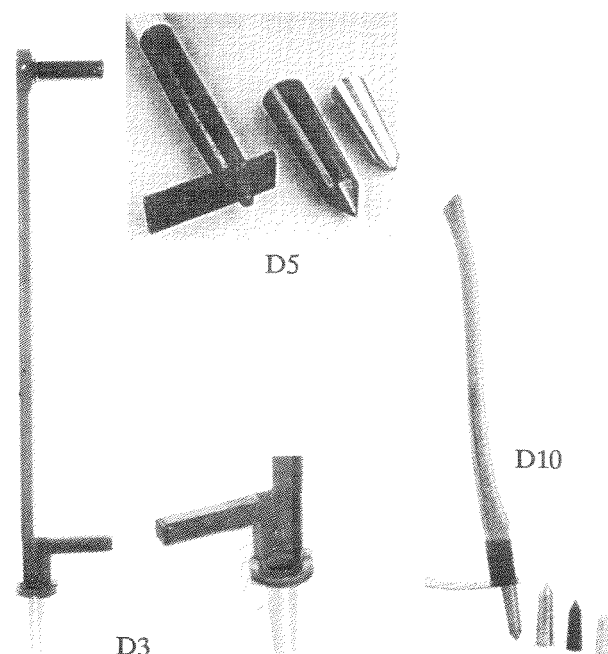
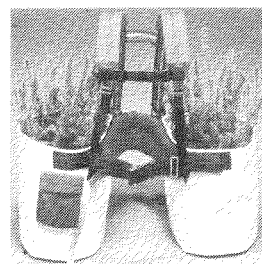
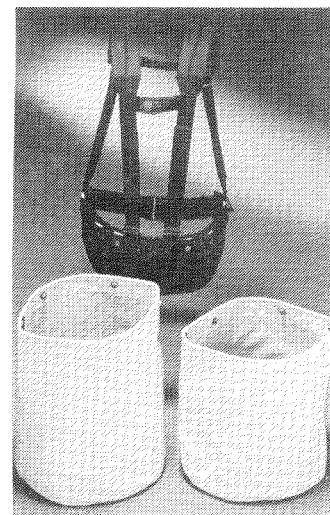


Figure 4. Dibbles and hole pipes.

are, for example, the amount of adjustment and padding built into the harness and belts, the size of the bags (diameter and depth), stiffeners in the pouch openings to prevent collapse and the degree of water proofing. Accessories available for the bags include: liner bags that are intended to keep the plants in a cool, moist condition; foam inserts to regulate the depth of the bags for various sizes of planting stock; and flagging tape dispensers.



E1a



E3



E3e (Multipot holder)

Figure 5. Planting bags.

II. Carrying equipment

E. Planting bags

There is a large array of planting bags to choose from on the market (Figure 5 and Table 5). Most bags are permanently attached to a harness, though some are detachable and some are carried by waist belts and shoulder straps. The quality of the bags is reflected to some degree by their price, but there are other characteristics to consider when selecting bags. Among these

Table 5. Specifications: carrying equipment

Equipment number and designation or trade name	Number of bags/containers carried	Pouch size (d=depth.) 0=diam.) (mm)	Detachable	Method of carrying	Suppliers (see Table 1) and their list price per unit. (\$) [NOT including quantity discounts]							
					AM	CFE	D	FW	H	KBM	NS	OSQ
<u>E. Planting bags</u>												
E1a. SYE	2	d=380; o=300	No	Harness				72			81	
E1b. SYE	3	d=380; o=300	No	Harness		89		80	89	80	88	
E2. Econo	3	d=330; o=300	No	Harness		70		54	65	66	65	
E3. Component	3	d=330; o=300	Yes	Harness				93	91			
E3a. Component Harness	-	-	-	-					46		48	
E3b. Component Pouch	(1)	d=330; o=300	Yes	E3a	Harness holds up to three pouches or Multipot holders.			15	16		18	
E3c. Component Pouch	(1)	d=380; o=300	Yes	E3a				16	16		20	
E3d. Component Econo Pouch	(1)	d=330; o=300	Yes	E3a				14	14		15	
E3e. " Multipot holder	(1)	-	Yes	E3a			15				14	
E4a. Planting bag	1	d=380; o=225	-	Waist belt		16			17			
E4b. Planting bag	1	d=380; o=225	-	Waist belt + shoulder strap		20			24			
E5a. Planting bags	2	-	No	Harness					69			
E5b. Planting bags	3	-	No	Harness					89			
E6a. Harness	-	-	-	-							42	
E6b. Pouch	(1)	d=380; o=480	Yes	E6a							20	
E6c. Economic Pouch	(1)	d=335; o=480	Yes	E6a							16	
E6d. Multipot holder	(1)	-	Yes	E6a							10	
E7. Planting bags	3	d=315	No	Harness							75	
E8. Planting bag	1	d=380	No	Waist belt							26	
E9a. Harness	-	-	-	-	Harness takes up to three pouches or Multipot holders (E3e adapted)		51					
E9b. Pouch	(1)	d=330; o=300	Yes	E9a			22					
<u>F. Planting baskets</u>												
F1. Polyethylene plantbox	1	d=180; o=N/A	N/A	Waist belt + shoulder strap		40			39			
F2. Planting basket	1	d=150; *	N/A	Waist belt + shoulder strap		30						
F3. Planting bucket (Polye.)	1 or 2	d=180; **	Yes	Waist belt or harness							26	***
<u>G. Multipot carriers</u>												
G1a. Hip bracket	1	N/A	N/A	Waist belt		32						
G1b. Hip bracket	2	N/A	N/A	Waist belt		55						
G1c. Hip bracket	3	N/A	N/A	Waist belt		82						
G1d. Hip carrier	4	N/A	N/A	Waist belt							35	
G2. Container handle (see also E3a + E3e; E9a + E3e)	1	N/A	N/A	By hand		20						

* Approximately rectangular: (300 × 600)mm.

** Approximately rectangular: (300 × 420)mm.

*** Price not yet determined

F. Planting baskets

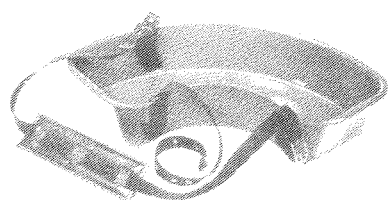
The kidney tray (F1, Figure 6 and Table 5) is made of hard polyethylene plastic and is carried by the planter on either side, using a waist belt and a shoulder strap. It was developed for the paperpot container system to be used in conjunction with the planting tube. This type of tray is incompatible with planting tools which require the planter to bend down to place the seedling in the cavity. From an ergonomic point of view, the kidney tray is not as good as bags carried in a harness because the load is carried on one side of the planter which creates an unbalanced static load on the shoulders. The trays are sold without padding for the waist belt which the planter normally has to add. Another basket (F3, Figure 6 and Table 5) is made of slightly flexible polyethylene plastic. Two of the detachable baskets are usually carried during actual planting work. The baskets can be carried in a harness or on a waist belt with specially designed plates. The weight of the loaded basket is centered closer to the body than in the kidney tray and therefore creates less strain. If carried in a har-

ness, the weight is better distributed. The depth of these baskets reduces the risk of losing seedling when the planter bends down.

G. Multipot carriers

Multipot-type trays can be carried during planting on hip-brackets which are attached to a waist belt (Figure 7 and Table 5). Depending on how the planting operation is organized, the planters carry one or two trays at a time. The hip-brackets, though commercially available, are also made locally in some places. Some manufacturers make multipot holders which can be attached to a harness in lieu of bags (Figure 5-E3e). Up to three holders can be fitted. The trays are then held in place by a hook and are easy to exchange.

There are also handles for carrying multipot-type trays by hand (Figure 7). A commercially-available one is designed to hold one tray only, but there are also locally-made ones which can be used to carry one or two trays while planting, and up to four during seedling distribution.

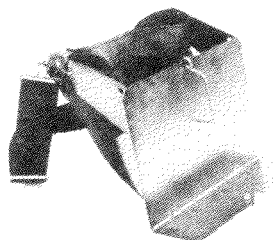


F1



F3

Figure 6. Planting baskets.



G1a

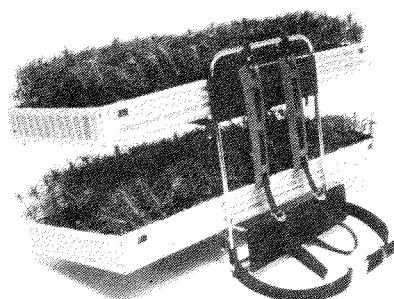


G2

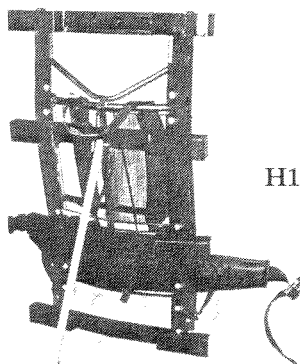
Figure 7. Multipot carriers.

H. Back-carriers

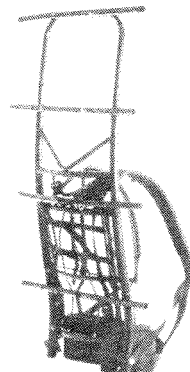
Back-carriers are designed for manual distribution of either multipot or paperpot containers (Figure 8 and Table 6). Multipot back-carriers are available for up to eight trays, i.e. a maximum of 536 seedlings. The carrier for paperpot containers will take two trays for a theoretical maximum of 672 seedlings. Back-carriers are also made locally (Figure 9).



H2



H1



H3 (H4)

Figure 8. Back-carriers.

I. Carriers for Roottrainers

Some tools and equipment are custom-made by small manufacturers located close to the end users. Examples of locally-made carrying equipment for Spencer-Lemaire's Roottrainers are shown in Figure 9.

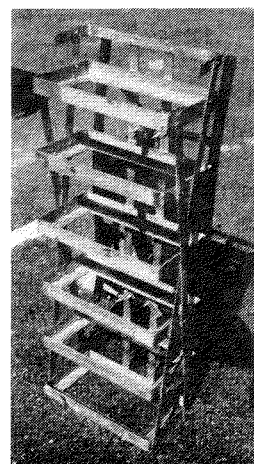
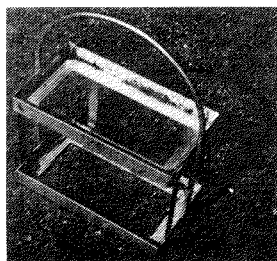
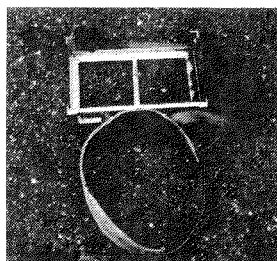


Figure 9. Hip-, hand-, and back-carrier for Roottrainers.

Table 6. Specifications: back carriers

Equipment number and designation or trade name	Number and type of container	Suppliers (see Table 1) and their list price per unit. (\$) [NOT including quantity discounts]							
		AM	CFE	D	FW	H	KBM	NS	OSQ
H. Back-carriers									
H1. Back-carrier	8 Multipot trays					112		115	
H2. Back-rack	2 Paperpot trays					85			
H3. Back-carrier	6 Multipot trays								95
H4. Back-carrier	8 Multipot trays								95

Conclusions

There is a large selection of tools and equipment for planting and carrying the types and sizes of planting stock used in eastern and central Canada. Some of the products are imported, but most are made in Canada either for commercial distribution or directly for the end user. Not all planting tools and carrying equipment that are commercially available have been included. Modifications are often made to meet local planting requirements.

Most tools are available in one standard length, though in several cases straight handles are optional. Straight handles are long enough to suit planters of different heights. Carrying equipment is usually only offered in

one size, but may be adjustable to some extent. Bags may be available in small, medium and large sizes.

The same tool or piece of equipment may be offered by different suppliers at significantly different prices. Prices are generally competitive and any differences may be reduced by quantity discounts which are not included in this report.

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