

The Cutting Edge

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Executive Summary

Spade manufacturers in several countries were asked how a spade should be sharpened and, specifically, the reasons why a particular method should be used.

There was common agreement that indeed spades should be sharpened and that a file should be used to do the sharpening. As to how and why, the responses ranged from “we ourselves are not certain and why it should be done that way.” to Wilkinson Sword®’s “We sharpen our spades on the front edge in a 30 degree angle as this, in our opinion is the best angle.” Neither technical nor empirical explanations were offered by any of the companies which responded.

An assessment of the responses received, and such material as could be found in the literature and the World Wide Web as well as general workshop practice and metallurgical considerations, resulted in the following conclusions:

1. It makes little practical difference to the functioning of the spade if the back or the front side - or both sides - is/are beveled to produce a cutting edge.

Some small advantage might accrue to the back bevel when sliding a spade across a hard surface - to clear the last traces of soil from a footpath for instance. With the bevel down, the cutting edge might be held just clear of the surface and thus the sharpened edge would have some protection from denting and chipping.

2. Under field or garden conditions, it is easier to produce a sharp cutting edge by beveling the back of the spade - the side facing the person digging - and this method also requires the least skill and dexterity on the part of the person doing the sharpening.
3. The most suitable tool for sharpening a spade is a single piece ‘axe’ file.

These conclusions were based upon technical considerations. During the 2006 gardening season, an informal practical investigation will be conducted. At Peel Teaching Garden, spades will be sharpened using all three techniques to see if there are any noticeable advantages to any particular method of sharpening.

Background

Depending on price and quality, a spade will be manufactured from mild or medium carbon steel or one of several alloy steels.

Carbon steels rely on the presence of carbon to modify the properties of the metal. Low carbon steels tend to be relatively soft, ductile and malleable. Low carbon or ‘mild’ steel is cheap, easily cut, bent and formed into complex shapes. Mild steel will take a cutting edge but, being soft, the edge is easily dulled. High carbon steel is very hard, it resists abrasion and it takes and holds a sharp cutting edge. High carbon steel tends to be expensive, brittle and difficult to work and shape. Medium carbon steels fill the mid range, being less expensive and intractable than high carbon steel and being rather tougher and harder than mild steel. Better quality forged spades are usually made from a grade of medium carbon steel. Over time, the cutting edges of carbon steel spades tend to get harder with use. Through

a process known as 'work hardening' the small deflections and stresses which result from digging, levering and chopping alter the internal crystal structure of the metal enhancing, to some degree, the keenness of the edge.

Alloy steels rely on the inclusion of one or more alloying elements to modify the properties of the resulting steel. For garden tool use, common alloying elements include manganese, chromium and nickel. Although the technical specifications for alloy steels used for the manufacture of garden tools vary over a wide range, all the alloys have improved strength, toughness and elasticity, while remaining soft enough to be sharpened by hand tools. Steels alloyed with nickel or a mixture of nickel and chromium have the additional advantage of taking and maintaining an attractive highly polished surface and of being strongly resistant to rusting and staining.

Spades are cutting and slicing tools which belong in the same edge-tool family as knives, swords, scythes, razors, axes, and plows.

These tools are either pressed or driven into something to divide it or pulled across the surface of something to sever it. Based on its mode of use and its familial relationship, one might expect that a spade would have a double beveled edge.

Next to a digging stick, the spade is the most basic and universal tool for cultivating the soil.

Spade sharpening is not a one-time deal. Depending on the type of work, the edge of a spade might need touching-up several times a day. Equally, the spade is used in the garden, perhaps a long way from any workshop facilities, so routine tool maintenance must be doable without fixed equipment or electrical machines. It is also imperative to understand that, while an able gardener might use a spade to cut the curved edge of a flowerbed as smoothly as an arrow flies, there is no expectation that this same gardener be a skilled machinist or metal worker.

Equipment

Bench Grinder

Several www sources suggest using a bench grinder. Even as a workshop tool, there are many reasons why a bench grinder should not be recommended for sharpening a spade.

- The wheels of a bench grinder are designed for the removal of small amounts of very hard tool steel. If soft metals are ground, the pores of the wheels rapidly clog up. As few home workshops have proper wheel-dressing equipment, spade grinding can compromise the usefulness, for any purpose, of the grinding wheel.
- Bench grinders spin at a very high speed and friction generates a lot of heat at the point of contact. Because the beveled edge of the spade is very thin, heat cannot dissipate sufficiently rapidly to prevent the extreme edge of the blade reaching very high temperatures. Even if the edge does not noticeably change colour and burn, the high temperatures will effectively anneal and soften the steel. Any tempering which was done during manufacture and any work hardening resulting from long use, will be lost and the resulting edge will have a degraded ability to resist deformation. Dipping the blade in a bucket of water between passes across the grinding wheel will not prevent the heat degradation of the cutting edge. The extreme temperatures only occur at the instant the wheel and metal are in actual contact.
- Bench grinders are not designed to accommodate large unwieldy objects such as spades. The working area of most grinders sold for home-workshop use is sufficiently restricted that any

safety devices , visors, etc. have to be removed. Also the tool-rest is too small and in the wrong place to support a spade. To make contact, the spade has to be held against the grinding wheel without support which almost guarantees an uneven and irregular cut. In a worst case scenario, the spade can catch on the grinding wheel and be driven into the tool rest causing the wheel to shatter.

If an old-style sandstone wheel - hand cranked or pedal operated and rotating in a water bath - is available it could, in skilled hands, be used for spade sharpening.

‘Dremel’ Type Grinder

These hand held ‘mini’ grinders are probably less impractical and less potentially dangerous than a bench grinder but they require a power source to operate and skill to produce a passable job. The tool is many times more expensive to purchase than a flat file and it takes longer to produce a good cutting edge. On balance, sharpening a spade with a small hand-held grinder is probably not worth the cost and complication.

File

Several sources specify the use of some sort of mill file; however, this is not a tool which can be recommended for garden work.

Mill files are designed for workshop use and come in two parts: the hardened steel cutting tool with a pointed tang and a wooden or plastic handle which fits onto the tang. The handle is removable so that it can be used with many different files thus saving the cost of purchasing a handle for every file in the workshop. In the garden, handles are inclined to come off and get lost between sharpenings. Using a tanged file without a handle is a dangerous practice as many apprentices and home handymen have discovered to their cost. It takes only a small skip or catch to drive the point of the tang through the palm of the hand or into the wrist. While this is not usually a fatal injury, it certainly spoils a person’s day.

An appropriate tool for sharpening edge tools in the garden is an axe file. Axe files are one-piece tools intended for field and forest use. One side of the blade has a double-cut tooth pattern, for removing large dents and chips, and the other side has a single-cut for finishing a keen edge. Axe files can be purchased in most hardware and outdoor stores and in better garden centres. The axe file illustrated carries the Nicholson® brand name and costs around eight or nine dollars Canadian.

Preferred Sharpening Procedure

For spades which have never been sharpened and spades which need re-sharpening on the back face:

1. Place the spade blade, face down, upon or against some suitable sturdy object with the spade handle resting on the ground. REFERENCE PAGE 5, Fig. 1 and Fig. 2

‘A suitable sturdy object’ could be a full compost box, a garden stool, a bar on a five-bar gate, a wheelbarrow with a load of sand in it or the rung of a ladder. Anything that won’t wobble about or fall over will do.

The two outer edges of the spade blade and the end of the spade handle combine to create a tripod which is very stable during the sharpening operation.

2. Stand or sit beside or behind the spade and brace the spade handle with a knee or leg so that the spade will not slide about.
3. (For right-handers. Sinisters make the usual adjustments) With the double-cut side of the file (the side with the

most lines on it) downwards, hold the tip of the file between the thumb and first two fingers of the left hand and apply downward pressure on the file as it is pushed forward and across the edge of the spade blade with the right hand. The idea is to create a shiny strip about a tenth of an inch (2mm) wide across the edge of the spade. Let the pressure off on the return stroke - there's no need to lift the file off the blade. Repeat the push/pull action until the slightest of burs can be felt with a fingernail on the front edge of the spade blade.

4. Turn the file over, so that the single-cut side is down, and do a couple of passes to smooth out any ridges left by the file teeth. The spade is now as sharp as it needs to be.

If you really must, you can turn the spade over and, while holding the blade as firmly as you can with one hand, the single cut side of the file can be passed lightly across the front face of the blade to remove the bur.

For spades which have been previously sharpened, or been partially beveled by the manufacturer, on the front face, proceed as above but make the back bevel only about half as wide i.e 1/20th inch (1mm). This procedure will result in a cutting edge similar to that used for axes. Future sharpenings will gradually wear away the front bevel but, in the mean time, the double-beveled edge will be somewhat stronger and less prone to dents and chips than a single-beveled spade.

Beveling the Front Edge

From the preceding 'preferred sharpening procedure', the difficulties which arise when an attempt is made to bevel the front face of the spade are apparent. (SEE Illustrations on page 6)

- The back of the spade blade is convex so when the blade is placed face up on a flat surface, it has only two points of contact - the centre of the blade and the tip of the handle. Unlike a tripod, a bipod is inherently unstable and, given the limited number of arms and legs that a gardener has to work with, it is almost impossible to hold the blade still and have two hands available to use a file.
- When the spade is propped against 'a suitable sturdy object' the lift or cant of the blade (the angle between the blade and the handle) causes the blade face to slope upwards. Instead of filing in a relatively horizontal plane, the file now has to be pushed uphill from beneath the supporting surface. Various web pictures show exactly this awkward filing position.
- To avoid the cant problem, some instructions say to file from the front of the edge towards the handle. This is a very dangerous practice because a slight slip of the file can put the fingers in to direct contact with the sharpened spade edge.
- While more expensive forged spades are relatively flat at the cutting edge, cheaper pressed-metal spades - the ones most likely to be found in garden tool sheds and the ones most in need of frequent re-sharpening - are noticeably dished especially at the outer inch or so. Using a flat file to cut inside a concave curve is at best difficult and, in tight curves, impossible.

Beveling Both Faces

Beveling both faces of the spade would, in theory, produce a stronger edge - two 30 degree angles producing an included cutting-edge angle of 60 degrees - which might offer some technical and even practical advantage when cutting tree roots. However, the sharpening process involves all the difficulties associated with beveling the inside edge. As the cutting edge will still chip or dent when it hits a stone or is dragged over a concrete surface, beveling both faces offers no real advantage in the garden and it is not worth the bother. If a root needs cutting, use an axe!

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After Word

This paper is posted for discussion purposes and in the faint hope that somewhere in the world there is still someone who remembers why manufacturers sometimes put a partial bevel on the front face of spades and shovels. To shed light - or heat - please email teachinggarden@rogers.com.

