Sharpening Handbook

Because *sharp enough* ... usually is not

Chapter 9

Gardening Tools

Axes - see Chapter 8

Billhooks 9-2

Bulb Planters 9-3

Bypass Pruners - see Secateurs (9-34)

Chainsaws - see Saw Chains (Chapter 8)

Crack Weeders 9-5

Cultivators - see Crack Weeders (9-5)

Edgers - see Turf Edgers (9-49)

Garden Augers 9-7

Gardening Knives - see Outdoor & Pocket Knives (Chapter 6)

Gardening Trowels - see Shovels (9-38)

Hand Axes & Hatchets - see Axes (Chapter 8)

Hand Mattock - see Japanese Garden Hoe/Tillers (9-50)

Hand Pruners - see Secateurs (9-34)

Harvest Knives 9-9

Hedge Shears 9-10

Hoes, garden & other 9-12

Knives for Gardening (propagating, pruning, and grafting) 9-20

Lawn Edger Blades 9-23

Lawn Mower Blades 9-23

Log splitter blades 9-25

Loppers - see guidance for Secateurs (9-34)

Machetes 9-26

Pickax / Pick Axe 9-28

Pick Mattock 9-28

Pole Pruners - see guidance for Secateurs (9-34) or Saws (Chapter 6)

Post Hole Diggers 9-30

Pruning Knives for Trees 9-32

Pruning Shears - see Secateurs (9-34)

Root Knives - see Serrated Edge Kitchen Knives (Chapter 10)

Saw Chains (for chainsaws) - see Chapter 8

Scarifiers - see Hoes (9-12)

Secateurs 9-34

Shovels 9-38

Shovels, Square 9-41

Sod Knives - see Hori Hori Knives (9-52) (or Serrated Edge Kitchen Knives (Chapter 10))

Sod Lifters 9-43

Soil Knives - see Hori Hori Knives (9-52)

Spades - see Shovels (9-38)

Spud Bars 9-45

Strawberry Pruners 9-46

String Trimmer Line Cutters 9-48

Trowels - see Shovels (9-38)

Turf Edgers 9-49

Warren Hoes 9-12

Yankee Weeder - see Japanese Weeding Sickles (9-59)

Japanese Gardening Tools

Garden Hoe/Tillers 9-50

Hori Hori Knives 9-52

Saws (Folding) 9-55

Trenching Hoes 9-57

Weeding Sickles 9-59

Bonsai Tools

Cutters 9-62

Repotting Sickles 9-64

Scissors 9-66

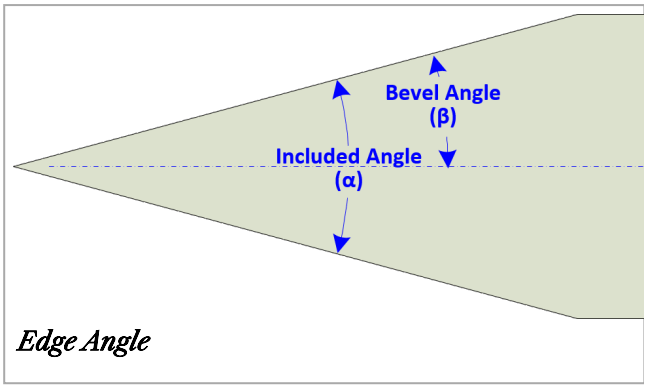
SharpeningHandbook.info

The full handbook, and the latest version of this chapter, are on the web at **SharpeningHandbook.info**. This chapter: November 2026.

Billhooks

Billhooks are sometimes called **slasher billhooks** or **bush hooks**. In either case, they are a tool which is vigorously swung by a person with both feet firmly planted on the ground.

Guidelines shown below are for **Included Angles** (α).



My father always looked for a person "strong of back and weak of mind" to use this tool. (I sometimes wonder why he left me one in his will.)
Rich Colvin

General Guidelines		
Type	α	Sharpness
General	45°	4

Notes & Comments

Grind Shape & Experience

The shape of the grind used is a call best made by the tool's use, based on your own experience. Additional notes are available on separate web pages for Grind Profiles (see Chapter 1), and Micro / Secondary Bevels (see Chapter 1).

More Information

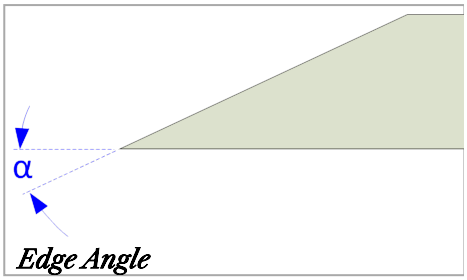
Sharpness Scale - see Chapter 1.
Ongoing maintenance - see Chapter 4, *Garden Tools*.
Grindstones and Other Sharpening Media - see Chapter 2.

Bulb Planters



Bulb Planter

I recommend sharpening the outside perimeter of the digging edge. This is much easier and safer than trying to sharpen the inside edge.



Edge Angle

Note to the sharpener: It is best to not have a very sharp edge on this. As the sides of the cone taper out towards from the bottom to the top, it is common to push the dirt out from the bottom when using this tool. If it is too sharp, you might cut your hand when using this tool.

A 6" smooth cut machinist's hand file (see Chapter 20) is useful to carry in your gardening tools box. Use it to resharpen the bulb planter as needed throughout the gardening activity.

When the flower blooms, the bees come uninvited.
Ramakrisna

General Guidelines		
Type	α	Sharpness
Step-Upon	45°	3
Hand-held	35°	3

Notes & Comments

Step-Upon

This angle will make the tool easier to use, and the digging edge will last longer than if sharpened to a more acute angle.

Hand-held

This is an option for this tool when working loose soil (i.e., soil which does not need as great a weight to push the tool into the soil). It could be as low as 30°; however that is not usually necessary and will cause the digging edge to lose its sharpeness sooner.

The more acute angle (45°) works well as an overall angle for the leading edge. It gives an edge which is less likely to be damaged if encountering rocks or other hard items in the soil.

Shaping the edge

New bulb planters I have purchased have an angle (α) of 90°. Therefore, initial shaping of the edge is to be expected.

If you use an angle grinder, consider using a 120 grit flap disc. A metal grinding wheel may be needed for large-scale shaping. In either case, be sure to not overheat the metal too much: it weakens the metal.

Sharpening the edge

Use a machinist's hand file.

1. Start with a 12-14" bastard file (as necessary).
2. Next, continue with a 8-10" medium (or second) cut file.
3. Finish with a 6" smooth cut file, then use this file to remove the burr.

More Information

> **Sharpness Scale** - see Chapter 1.
> **Ongoing maintenance** - see Chapter 4, *Garden Tools*.

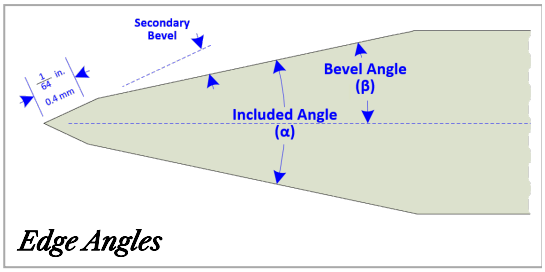
Crack Weeder



Crack Weeder

The **Crack Weeder** is used for uprooting weeds in bricks and other minor activities in the garden.

The hooked side is used to drag between the bricks, and is not sharpened, though it may need to be re-ground to not have the edges rounded over.



Edge Angles

Dandelions, like all things in nature, are beautiful when you take the time to pay attention to them.
June Stoyer

The back edge (bottom, right in the picture to the left) may be sharpened for use as needed. Guidelines shown below are for **Included Angles** (α). The two edges could be sharpened differently, but that is not typically done.

There can be a debate about how sharp the back side knife should be. Notes regarding this are below in the **Notes & Comments** section.

General Guidelines	
α	Sharpness
35° - 40°	5

Notes & Comments

This edge will get banged around a bit, so it could even be ground up to 45° or 50°.

How Sharp Should a Crack Weeder Be?

The gardener needs to decide how sharp the back edge of the Crack Weeder should be based on the activities for which the tool will be used. But in general, it should less sharp than tools like hoes.

Tormek Notes

The Tormek SG-250 grindstone works well for sharpening this tool. Also, grinding the outside edge using the Tormek's vertical position (with the grindstone rotating towards the edge) is recommended.

Because the blade is curved, the KS-123 does not work for this application.

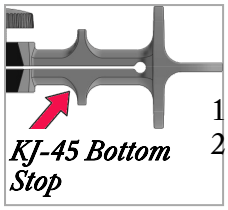
Bench & Angle Grinders

Using a bench or angle grinder is not recommended as this will surely overheat the tool, removing the temper from the edge. Additionally, the shaping of the edge is difficult to control.

Sharpening the Edge

If using a Tormek with the KJ-45 jig, the bottom stop is recommended (as indicated in the picture to the left). This makes setting the angle far easier.

The picture on the right shows a Japanese weeding sickle being sharpened on a Tormek (the blue piece behind the grinding wheel is a drip tray).



If you choose to use a machinist's hand file,

1. Start with a 8-10" medium (or second cut) file.
2. Finish with a 6" smooth cut file, then use this file to remove the burr.

Micro Bevel Notes

The micro bevel (see Chapter 1) makes the resharpening of this tool easier. If you sharpen the tool using a machinist's hand file, this is recommended. It is less critical if you use a Tormek grinder for the sharpening.

More Information

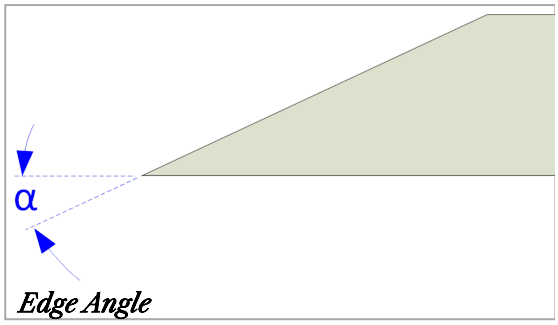
Sharpness Scale - see Chapter 1.
Ongoing maintenance - see Chapter 4, *Garden Tools*.
Grindstones and Other Sharpening Media - see Chapter 2.

Garden Augers



Garden Auger with area highlighted for sharpening

Sharpening the top side of the auger's leading edge is generally recommended as this enables the auger to dig quite well. This is the area denoted in the red box in the picture to the left.



There is one design of the auger's screw threads I've seen where the cutting edge seems to take a sharp turn towards the bottom. In this case, it is recommended to sharpen the opposite edge.

In either case, the leading edge must be the lowest part of the helical screw thread which wraps around the axis.

Most of these augers are fully painted. Changing the leading edge's angle will surely expose fresh metal. Thusly, the notes below on Ongoing Maintenance should be followed.

A 6" smooth cut machinist's hand file (see Chapter 20) is useful to carry in your gardening tools box. Use it to resharpen the shovel as needed throughout the tool's usage for the day.

> *You can bury a lot of troubles digging in the dirt.*
> unknown

General Guidelines for 4-Facet Grind	
α	Sharpness
45°	3

Notes & Comments

If this is a hand-driven auger (vs. one driven by a drill), and it is only used in clean dirt, a 30° edge angle may be useful. Do note though that this can lead to easier damage to the edge if stones or other hard objects are encountered.

Shaping the edge

New garden augers often have an angle (α) of 90°. Therefore, initial shaping of the edge is to be expected.

A machinist's hand file such as a 12-14" bastard file is often sufficient for this task.

If you use an angle grinder, consider using a 120 grit flap disc. A metal grinding wheel may be needed for large-scale shaping. In either case, be sure to not overheat the metal too much: it weakens the metal.

Sharpening the edge

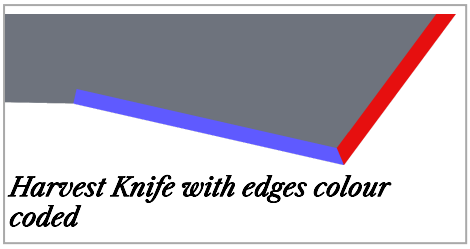
Use a machinist's hand file.

1. Start with a 8-10" medium (or second) cut file.
2. Finish with a 6" smooth cut file, then use this file to remove the burr.

More Information

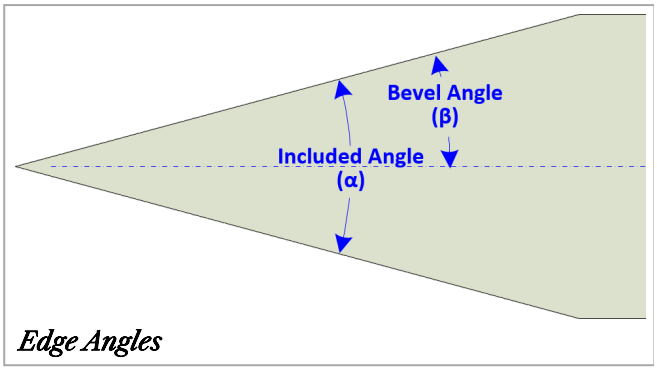
Sharpness Scale - see Chapter 1.
Ongoing maintenance - see Chapter 4, *Garden Tools*.

Harvest Knives



Harvest Knife with edges colour coded

Harvest Knives are used for harvesting vegetables and fruit in the garden.



Edge Angles

Guidelines shown below are for **Included Angles (α)** for both the **red** and the **blue** edges. The two edges are discussed separately as they may be sharpened differently.

> *I cultivate my garden, and my garden cultivates me.*
> Robert Brault

General Guidelines			
Blade Section	α		Sharpness
	Recom.	Range	
Red *(End)*	**24˚**	24˚ - 30˚	7
Blue *(Side)*	**30˚**	30˚ - 40˚	7

Notes & Comments

Red (End)

This part of the knife is used with a push stroke, and a sharp edge will help move it quickly through the plant's stem which is holding the part you want to harvest.

Blue (Side)

This part of the knife is typically used with a pulling motion to cut thru a tougher part of the plant.

Some of these knives are sold with serrated edges, so the guidance for serrated knifes (see Chapter 10) may be useful.

Tormek SVD-110 Notes

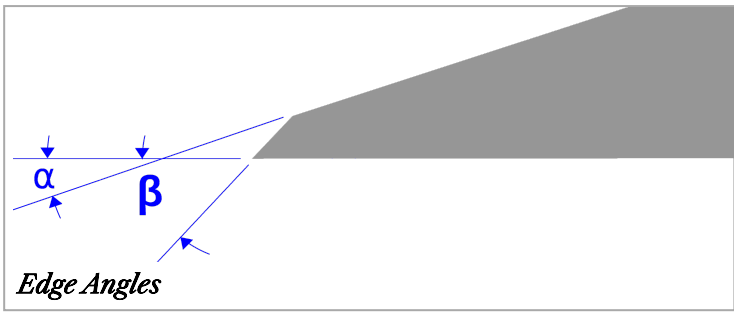
When using the SVD-110 for sharpening this, I had to install it on the Universal Support Bar "upside down" (i.e., with the thumb screw on the bottom side). This allowed me to get the needed angle for sharpening. Also, I had to remove the honing wheel to provide adequate clearance for sharpening the full length of the side (the blue part in the picture above).

> **Sharpness Scale** - see Chapter 1.
> **Ongoing maintenance** - see Chapter 4, *Knives*.
> **Grindstones and Other Sharpening Media** - see Chapter 2.

Hedge Shears

Hedge Shears are sharpened according to the angles shown below.

Sharp shears impart clean cuts to area of the plant being addressed, minimizing the damage to the plant, and helps the plant to thrive.



Edge Angles

The angle for **α** is not critical. I left it set at the angle that was on the tool originally.

> *We must cultivate our own garden. When man was put in the garden of Eden, he was put there so that he should work, which proves that man was not born to rest.*
> Voltaire

A 6" smooth cut machinist's hand file (see Chapter 20) is useful to carry in your gardening tools box. Use it to resharpen the hedge shears as needed throughout the gardening activity.

General Guidelines			
Purpose	α	β	Sharpness
Dead-heading Only	20°① - 30°	30°	6
General Purpose or for Touching-Up Hedges		35°② - 40°	5
Extreme Trimming of Hedges		50°	5

Notes:

① My Felco hedge shears have an **α** of 20°.

② My Felco hedge shears have an **β** of 35°.

Notes & Comments

Dead-heading Only

If you have a tool to dedicate to this, a sharper angle like this can make the job much easier.

Do note: the **β** angle should be 3° to 5° greater than the **α** angle to allow for faster (and easier) re-sharpening. This is fundamentally a micro bevel (see Chapter 1).

General Purpose or for Touching-Up Hedges

Pruning perennials & dead-heading is an activity is something I commonly do, and having a rather average one is useful. The perennials often have thicker stems and a greater angle is useful to keep the tool sharp longer.

This is also a good general-purpose sharpening angle.

Extreme Trimming of Hedges

The trimmers I purchased years ago from a hardware store had a 70° angle for **β**. That seems a bit extreme.

Given the propensity to use electric trimmers for trimming bushes these days, this angle is generally not recommended.



KJ-140 Knife Jig

Tormek Jig Notes

If using a Tormek to sharpen this blade, the KJ-140 Knife Jig or SVM-140 Knife Jig work best. The SVM-100 Knife Jig, KJ-45 Knife Jig, SVM-45 Knife Jig, or SVD-110 Tool Rest may also be used.

Shaping the edge

Initial shaping of the edge is not typically needed.

If you use an angle grinder, consider using a 120 grit flap disc. A metal grinding wheel may be needed for large-scale shaping. In either case, be sure to not overheat the metal too much: it weakens the metal.

Sharpening the edge

If you are using a Tormek to sharpen the tool, it is recommended to use the vertical position with the grindstone rotating towards the blade. If you use the horizontal position, the grindstone will tend to pull the hedge shears away from the jig.

If you use a machinist's hand file,

1. Start with a 12-14" bastard file (as necessary).
2. Next, continue with a 8-10" medium (or second) cut file.
3. Finish with a 6" smooth cut file, then use this file to remove the burr.

Honing the Edge

Honing is not recommended for this tool as it will make the gardening activities harder: as with kitchen scissors (see Chapter 14), coarseness in the edge helps to ensure the piece being cut does not slide out. Stop after the sharpening step (but with a high grit level - 1,000 or so).

Also, as this tool is often purchased with one blade having serrations on it, keeping the edge a little coarse can remove the need for those serrations.

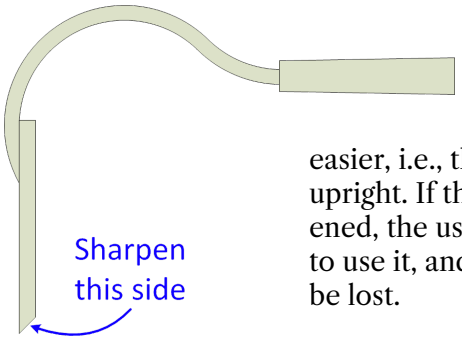
More Information

Videos & Presentations

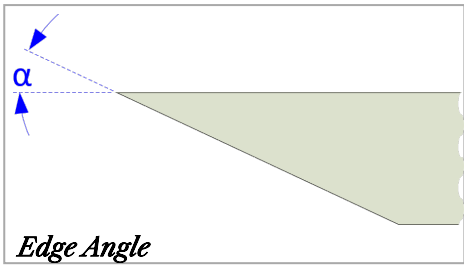
- Tormek Live Sharpening Class - Special - Gardening tools (YouTube video). Wolfgang and Sèbastian from Tormek did a special episode of their sharpening class, focusing on the gardening tools. Learn how to sharpen secateurs, lawn mower blades, a scythe, hedge shears and other tools that you use in the garden!
- Tormek AngleMaster WM-200 (YouTube video)

> **Sharpness Scale** - see Chapter 1.
> **Ongoing maintenance** - see Chapter 4, *Garden Tools*.
> **Grindstones and Other Sharpening Media** - see Chapter 2.

Garden & Other Hoes



I recommend sharpening the edge closer to the user as it makes the angle for using the tool easier, i.e., the user can stand more upright. If the other edge is sharpened, the user will have to bend down to use it, and the joy of gardening will be lost.



Some hoes have more than one edge to be sharpened. In those cases, each edge can be sharpened at a different angle, and thusly there is more than one angle specified on this page (i.e., α_1, α_2, & α_3). The use of differing angles is not necessary, but is recommended, and notes are given for the recommendations.

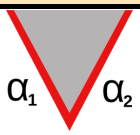
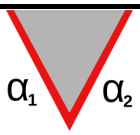
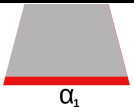
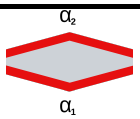
A 6" smooth cut machinist's hand file (see Chapter 20) is useful to carry in your gardening tools box. Use it to resharpen the hoe as needed throughout the gardening activity.

The best fertilizer in the garden is the gardener's shadow.
Unknown

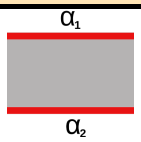
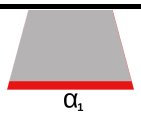
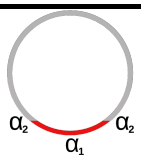
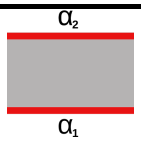
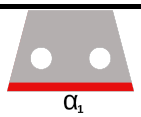
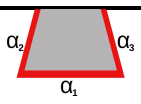
In the pictures in the table below (except for the hoop hoe), the bottom side of the picture is the user's side of the hoe.

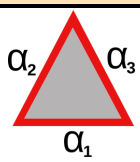
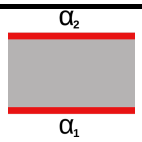
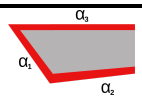
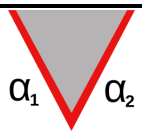
Photographs of each of these hoes are on the web site.

General Guidelines

Purpose	User Stroke	Angles			Sharpness
Cape Cod Weeder  Also known as: • **Drill Hoe** • **Pointed Cultivator Hoe**	Pull	α_1 25°	α_2 35°	*n/a*	5
CobraHead Hoe 	Swung	α_1 35°	α_2 35°	*n/a*	5
Collinear Hoe 	Side-to-side Sweeping	α_1 25°	*n/a*	*n/a*	5
Diamond Weeder  Also known as: • **Diamond Shuffle Weeder**	Pull & Push	α_1 25°	α_2 25°	*n/a*	5

General Guidelines

Purpose	User Stroke	Angles			Sharpness
Dutch Hoe 	Push & Pull or Push	α_1 25°	α_2 25°	*n/a*	5
Garden Hoe  Also known as: • **Drag Hoe** • **Draw Hoe** • **Floral Hoe**	Pull	α_1 25°	*n/a*	*n/a*	5
Grubbing Hoe 	Down Swing & Pull	α_1 40° - 45°	*n/a*	*n/a*	3
Hoerake 	Pull	α_1 30° - 40°	*n/a*	*n/a*	3
Hoop Hoe  Handheld version known as: • **Garden Bandit Loop Weeder**	Pull	α_1 15°	α_2 25°	*n/a*	5
Loop Hoe 	Side-to-side Sweeping	α_1 25°	α_2 25°	*n/a*	5
Mortar Hoe  Also known as: • **Mason's Hoe** • **Plaster's Hoe**	Pull & Push	α_1 45°	*n/a*	*n/a*	3
Onion Hoe, & other 3-Sided Hoes  Also known as: • **Tobacco Hoe**	Pull & Side	α_1 25°	α_2 25°	α_3 35°	5

General Guidelines					
Purpose	**User Stroke**	**Angles**			**Sharpness**
Scuffle Hoe  Also known as: • **Floral Scuffle Hoe** • **Full Moon Hoe** • **Half Moon Hoe**	Pull & Push	α_{1a} α_{1b} 25°	α_2 25°	α_3 30°	5
Stirrup Hoe  Also known as: • **Express Hoe** • **Greenman Wiggle Hoe** • **Oscillating Hoe**	Pull & Push	α_1 30°	α_2 25°	*n/a*	5
Swoe  Also known as: • **3 Edge Hoe**	Pull, Push, & Side	α_1 30°	α_2 25°	α_3 25°	5
Warren Hoe 	Pull	α_1 25°	α_2 35°	*n/a*	5

Notes & Comments

Cape Cod Weeder & Drill Hoe & Pointed Cultivator Hoe

This is a baby version of a Warren Hoe with a head which is only about 2” wide.

This hoe has two edges to be sharpened, opening up some nice opportunities for the gardener as one side can be at a different angle than the other. As with the Warren hoe, sharpening one side at the recommended 25° and the other at 35° makes it a more versatile tool.

These can be found with a long handle for use when standing, or with a shorter handle for use when kneeling or seated. If sharpening the shorter handled hoe, consider sharpening the under side if the angle for use of this hoe merits it.

Depending on the user's handedness (left vs. right), the values for α_1 & α_2 could be swapped for easier use.

CobraHead Hoe

This tool is a deep digger, which gets swung by the user to dig up problematic weeds.

This hoe has two edges to be sharpened, but I recommend keeping them the same.

These can be found with a long handle for use when standing, or with a shorter handle for use when kneeling or seated. The shorter handled version can have higher values, up to 40°, but the longer handled vershion should not have such a dull angle.

Collinear Hoe
This tool is a lighter weight hoe. It is a scarifier, used for cutting the weeds close to surface of the dirt.

This could be as high as 30˚; however that is not usually necessary.

Diamond Weeder & Diamond Shuffle Weeder
This tool is a scarifier, used for cutting the weeds close to surface of the dirt. If the gardening area is fairly rock-free, then a 20˚ angle may be quite useful as it will make cutting the weeds a bit easier.

Diamond Shuffle Weeders typically have a long handle for use when standing.

Diamond Weeders typically have a shorter handle for use when kneeling or seated. This shorter handled version can have higher values, up to 40˚, but the longer handled vershion should not have such a dull angle.

Dutch Hoe
There seems to be two versions of this hoe: one which works with a push & a pull cut, and a less commonly found one which only works on a push cut (e.g., the *DeWit Dutch hoe*).

For the hoes which only cut on the push stroke, use the α_1 angle recommendation.

This could be as low as 20˚, or as high as 30˚; however that is not usually necessary. 25˚ is a good selection for weeding in the garden: it is sharp enough that it shears the weeds well at, or just below, the ground level.


Royal Dutch Hoe

Sneeboer makes a variation of this hoe called a *Royal Dutch Hoe*. For this style, sharpening to 20˚ is not a recommended option as it would be difficult to safely sharpen the hoe's many cutting edges to that angle.

Garden Hoe & Drag Hoe & Draw Hoe & Floral Hoe
This is a good selection for weeding in the garden. It is sharp enough that it shears the weeds well at the ground level.

This could be as high as 30˚; however that is not usually necessary.

Grubbing Hoe
This is a heavy-duty tool used to break up soil. Depending on the user's area, it may need to have an edge approaching 60˚ (especially if the ground is rocky or highly compacted).

These can be found with a long handle for use when standing, or with a shorter handle for use when kneeling or seated. If sharpening the shorter handled hoe, consider sharpening the under side if the angle for use of this hoe merits it.

Hoerake
DeWit makes a rather unusual tool called the hoerake (or hoe-rake). This is rake with a hoe edge added to enable the user to break up soil and remove weeds at the same time. Crocus in the UK sells them, and notes that it is "...especially handy for weeding in gravel...".

Given that use, a very acute angle is not recommended, nor is a high degree of sharpeness recommended.

Hoop Hoe & Garden Bandit Loop Weeder
The hoop hoe can be sharpened with a single angle, or if the sharpener is adventurous then the sides can be at a different angle (e.g., 20˚-25˚), and those edges blended together. This would be a good idea if the hoe is used for purposes other than merely weeding. The higher angle will help keep it from dulling quickly when breaking up dirt clods or taking out bigger weeds.

These can be found with a long handle for use when standing, or with a shorter handle for use when kneeling or seated. If sharpening the shorter handled hoe, keep the same sharpening approach as for the longer handled version (sharpen the inside of the curve).

It is important to not sharpen too far up on the circle as that part is used to push plants back when hoeing.

Lee Valley sells a **Garden Bandit Loop Weeder** which is a hand-held version of this tool. Use the same sharpening guidance.

Loop Hoe

This tool is a scarifier, used for cutting the weeds close to surface of the dirt.

Mortar Hoe & Mason's Hoe & Plaster's Hoe

This is a good selection if the hoe is used for purposes other than weeding. The higher angle will help keep it from dulling quickly. This could be as high as 60˚. Consider this approach if using your hoe for activities such as mixing concrete in your wheel barrow.

Mortar hoes usually have holes in the blade to allow the material to flow through it, making the mixing easier. Ensure these are clear of dried up concrete or other obstructions.

Onion Hoe & Tobacco Hoe

These hoes have 3 sides which get sharpened.

α_1: The bottom is sharpened for typical use.
α_2: The left side is sharpened to the same angle as the bottom, and is used when the gardener needs to flip the tool on edge to get into a narrow space.
α_3: The right side has a greater angle to make this a usable tool for also breaking up soil.

These can be found with a long handle for use when standing, or with a shorter handle for use when kneeling or seated. If sharpening the shorter handled hoe, consider sharpening the under side if the angle for use of this hoe merits it.

Depending on the user's handedness (left vs. right), the values for α_2 & α_3 could be swapped for easier use.

Scuffle Hoe & Floral Scuffle Hoe & Full Moon Hoe & Half Moon Hoe

This tool is a scarifier, used for cutting the weeds close to surface of the dirt.

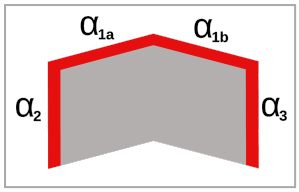
One style of this hoe has 3 sides in a triangular shape, and all 3 sides can be sharpened differently.

α_1: The user side is sharpened for typical use.
α_2: The left side is sharpened to the same angle as the user side, and is used when the gardener needs to use the tool with a push stroke.
α_3: The right side has a greater angle to make this a usable tool for also breaking up soil. If this tool is used only for scarification, then this angle should also be 25˚.

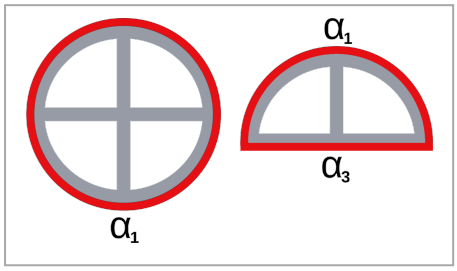
Depending on the user's handedness (left vs. right), the values for α_2 & α_3 could be swapped for easier use.

An uncommon style of this hoe has 4 sides in a similar shape, but with 4 sides which are sharpened, and all 4 sides can be sharpened differently. Do note that this hoe is used in a push motion.

α_{1a}: The leading edge side is sharpened for typical use.



α_{1b}: The other leading edge side is also sharpened for typical use, but can be different from α_{1a} if desired.
α_2: The left side is sharpened to the same angle as the user side, and is used when the gardener needs to use the tool with a push stroke.
α_3: The right side has a greater angle to make this a usable tool for also breaking up soil. If this tool is used only for scarification, then this angle should also be 25°.



DeWit makes some other uncommon styles of this hoe. One is a "*full moon*" (left), and the other is a "*half moon*" (right). Do note that the hoe has a full moon shape, and this site is not recommending naked gardening (full Monty).

You could get brave and sharpen the full moon with differing angles around the circle, but that seems difficult to maintain over time.

The half moon could easily have a different angle on the pull side (α_3) than on the circular side (α_1, used for the push stroke).

Stirrup Hoe & Express Hoe & Greenman Wiggle Hoe & Oscillating Hoe

This tool is typically used as a scarifier, cutting the weeds close to surface of the dirt.

These hoes have 2 sides which can be sharpened differently. If the gardener desires two separate angles, these are recommended

α_1: The near side is sharpened with a larger angle so the tool can be used for clearing out bigger weeds using the pull stroke.
α_2: The far side is sharpened to the at a smaller angle to make the push stroke easier when removing typical weeds.

Some gardeners choose to keep the push and pull sides the same as they use a scarifing or shuffling motion to weed the garden or walk.

These can be found with a long handle for use when standing, or with a shorter handle for use when kneeling or seated. If sharpening the shorter handled hoe, consider sharpening the under side if the angle for use of this hoe merits it.

Oscillating Hoes: The *Express Hoe* and *Greenman Wiggle Hoe* are oscillating hoes, meaning that the hoe blade swings back when pushed forward, and forward when pulled back. With this activity, the effective angle for α_2 may need to be increased to something like 35°. Use your judgement based on what you find when using this tool.

To help you understand the oscillating movement, this is a video of an oscillating hoe in action.

Swoe & 3 Edge Hoe

These hoes have 3 sides in a form of a triangular shape, and all 3 sides can be sharpened differently. There is a triangular shape towards the user, and a flat side away from the user.

α_1: The shorter edge on the user's left side is sharpened for a heavier use.
α_2: The user's right side is sharpened for typical use.
α_3: The side away from the user is sharpened the same as as α_2. This side is used much like the far side on the stirrup hoe.

Depending on the user's handedness (left vs. right), the values for & α_2 could be swapped for easier use.

This tool is typically used for weeding plants with medium depth roots.

Warren Hoe

Warren hoes are typically used for weeding or creating a furrow for planting. This hoe has two edges to be sharpened, opening up some nice opportunities for the gardener as one side can be at a different angle than the other. My experience has been that sharpening one side at the recommended 25° and the other at 35° makes it a more versatile tool.

Depending on the user's handedness (left vs. right), the values for α_1 & α_2 could be swapped for easier use.

Usage Notes

Scarifiers (e.g., shuffle hoes) are used to scrape or scarify the surface rather than dig up the soil. These could be sharpened to a more acute angle as there is minimal chance of encountering any underground rocks. Weeds which grow from seed, like lambsquarters, chickweed, purslane, and some other grasses, should be removed with such a hoe.

The sharpener should consider this and might reduce the angle for α by 2° to 5°, but in any case, the angle should not be reduced below 25°.

Deep Diggers (e.g., cobrahead hoes) are used to attack perennial weeds and need a different sharpening approach. For weeds like burdock, yellow dock, and quackgrass that have either strong taproot systems or rhizomatous roots, you'll need to get a bit dirty. After a rain shower and when the soil is moist, get down onto the ground and dig them out using a tool like a CobraHead hoe.

The sharpener should consider this and should increase the angle for α by 2° to 5°, but in any case, the angle should not be reduced below 40°.

Shaping the edge

New hoes I have purchased have an angle (α) of 90°. Therefore, initial shaping of the edge is to be expected.

If you use an angle grinder, consider using a 120 grit flap disc. A metal grinding wheel may be needed for large-scale shaping. In either case, be sure to not overheat the metal too much: it weakens the metal.

Sharpening the edge

Use a machinist's hand file.

1. Start with a 12-14" bastard file (as necessary).
2. Next, continue with a 8-10" medium (or second) cut file.
3. Finish with a 6" smooth cut file, then use this file to remove the burr.

More Information

Books & Papers

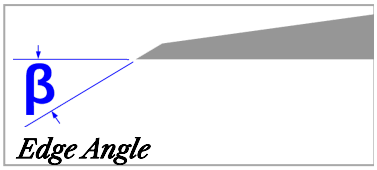
- Green Thumb Catalog (archive.org) (1972), by The Union Fork and Hoe Company.
- Manual of Gardening (archive.org) (1918), by Liberty Hyde Bailey.

Some pictures are courtesy A.M. Leonard Horticultural Tool & Supply. The hoerake image is courtesy DeWit.

Sharpness Scale - see Chapter 1.
Ongoing maintenance - see Chapter 4, *Garden Tools*.

Gardening Knives

Gardening Knives get used to do work, and the guidance provided below is based on that. These are usually folding knives, typically made by Victorinox and sold by Swiss Army or Felco. They are also made by Tina in Europe.



In Peter Thompson's book, Creative Propagation, he noted:

> *... in unskilled hands, knives are not easily maintained in a continuously sharp state and are all too capable of inflicting serious cuts (to the gardener, not just the plant). They also have the disadvantage of being the number one, ace carrier of virus diseases from one plant to another ...*

These blades are typically sharpened on only one side as shown in the picture to the right. Thusly, guidelines shown below are for **Bevel Angles (β)**. If the knife is sharpened on two sides, the included angle (α) would be double the bevel angle (β), though an angle less than 2x should be considered.

> *Society grows great when old men plant trees under whose shade they will never sit.*
> Anonymous

These blades are quite thin (aprox. 0.4mm / 0.015"), so consider sharpening them at the β values noted below, and adding a 2° - 3° micro bevel (see Chapter 1). This approach will make the re-sharpening much faster and significantly reduce the metal removed with each resharpening. (More about this is below in the section, Sharpening Using Multiple Grindstones.)

The sharpened edges are denoted in the pictures below using red.

General Guidelines

Blade Type	β	Micro bevel	Sharpness
Propagating & Pruning 	20°	+3°	7
Grafting 	20°	+3°	7

Notes & Comments

Propagating & Pruning

These knives are commonly used for propagating plants by arborists, gardners, orchardists, vintners, other horticulturists, and pruning flowers by florists.

Propagation: Knives used for propagation should definitely be honed to maximum sharpness. This will minimize the damage to the plant, and will also reduce the potential that the gardener injures themself by pushing too hard.

The blade has an overall angle of 15°, but the cutting edge is less acute as denoted by the value of β to the left.

Grafting
These knives are commonly used for grafting a scion onto some rootstock by arborists, gardners, orchardists, vintners, other horticulturists.

The blade has an overall angle of 15°, but the cutting edge is less acute as denoted by the value of **β** to the left.

Knives used for grafting should definitely be honed for maximum sharpness. This will minimize the damage to the plant, and will also reduce the potential that the gardener injures themself by pushing too hard.



Key Note: Do not sharpen the part shown in blue in the picture to the left (the part which looks like a camel's hump). That is a **bark lifter** which is used in the grafting process. It should not be any sharper than it was when purchased. This part projects out from the knife's blade when closed, and if sharpened, it will cut the user's hand and the trousers pocket into which the knife is placed.

Concave Blade Edges
Blades with a concave edge need special attention when sharpening to not mess up the curved edge.

The YouTube video by Dr. Vadim Kraichuk, Sharpening knives with concave curves, is worth reviewing if you have questions on the approach to use.

Sharpening Using Multiple Grindstones
When sharpening using multiple grindstones (e.g., starting with the SG-250 grindstone, and following-up with the SJ-250 Japanese grindstone), adding a micro bevel of 2° - 3° will make the re-sharpening much faster.

For example,

1. Start with the SG-250 grindstone, set at 20°. Remember, you are only sharpening one side of the blade, just like with a chisel. (Fundamentally, this is not so much sharpening as shaping the edge.)
2. Switch to the SJ-250 Japanese grindstone, set at 23°.
3. Hone using the Tormek leather honing wheel using the PA-70 honing compound.

Some question the need to hone after using the 4,000 grit SJ-250 Japanese grindstone; I have found it useful, especially as the PA-70 honing compound is 8,000 grit. The composite honing wheel is considered to be in the 2,000-2,500 grit range, so it may not be as useful for following up after the SJ-250 Japanese grindstone.

This approach is particularly useful for thinner knife blades as the blade can often be resharpened using only the SJ-250 Japanese grindstone and then honing again.

The Tormek KS-123 Knife Angle Setter jig is very useful when changing between grindstones.

Other Tormek Jig Notes
The KS-123 Knife Angle Setter jig is quite useful if using the WM-45 Knife Jig to hold the blade.

Calculators
I find that usage of calculators for setting specific angles to a high degree of accuracy is not critical. It is much more critical to resharpen often. If you choose to use a calculator to achieve a specific angle to a high degree of accuracy, there are a number of online calculators (on the web site) that can also be used for sharpening knives.

More Information

Books & Papers

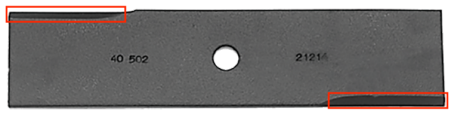
- “Creative Propagation” (2005), by Peter Thompson

Web Sites

- Jigs, Fixtures, & Modifications (see Chapter 3). One of the key ones for this topic is below.
    - Jan Švancara posted a design for using a **knife sharpening platform** in 2015 on the Tormek Forum. This is certainly worth reading, and there are also pictures of this in the jigs section.
- Science of Sharp (scienceofsharp.com) - a web site which uses “electron microscopy to physically observe the geometry and polish of the edge and to quantify the edge width and bevel angle. The goal is to provide an understanding of what is happening a the blade's edge. The centuries old design of a straight razor provides the ideal system for scientific study of sharpening.”

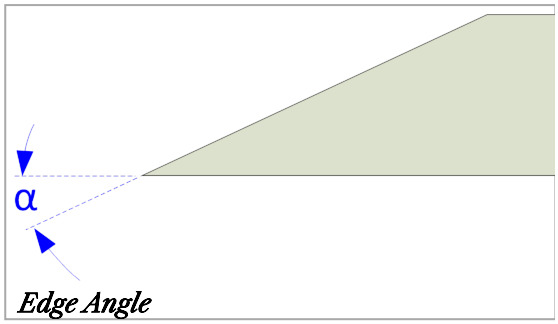
> **Sharpness Scale** - see Chapter 1.
> **Ongoing maintenance** - see Chapter 4, *Garden Tools*.
> **Grindstones and Other Sharpening Media** - see Chapter 2.

Lawn Mower & Lawn Edger Blades

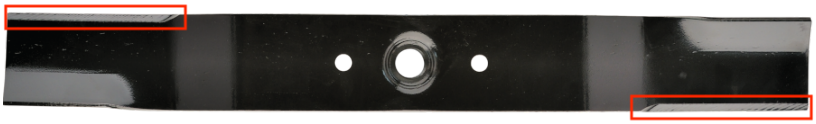


Lawn Edger Blade

On **Lawn Edger blades**, sharpen the side of the blade which is the leading edge. The areas to be sharpened are highlighted in red.



Edge Angle



Lawn Mower Blade

On **Lawn Mower blades**, sharpen the upper side of the blade's leading edge. The areas to be sharpened are highlighted in red.

Care must be taken to **ensure the blade remains balanced** (i.e., ensuring that the removal of metal during the sharpening is equal on both sides). For this reason (and many others), it is highly recommended to perform the sharpening of the blade after removing it from the mower or edger.

When the world wearies and society fails to satisfy, there is always the garden.
Minnie Aumonier

General Guidelines	
α	Sharpness
30°	5

Notes & Comments

30° Grind

If using a Tormek to sharpen this blade, the SVM-45 Knife Jig can be used, but I'd recommend using the SVD-110 Tool Rest.

The Lee Valley Rotary Mower Sharpener sharpens blades at 25°.

Shaping the edge

New blades probably will not need reshaping. However, if a nick is in the edge, this may be needed.

If you use an angle grinder, consider using a 120 grit flap disc. A metal grinding wheel may be needed for large-scale shaping. In either case, be sure to not overheat the metal too much: it weakens the metal.

Sharpening the edge

Use a machinist's hand file.

1. Start with a 12-14" bastard file (as necessary).
2. Next, continue with a 8-10" medium (or second) cut file.
3. Finish with a 6" smooth cut file, then use this file to remove the burr.

More Information

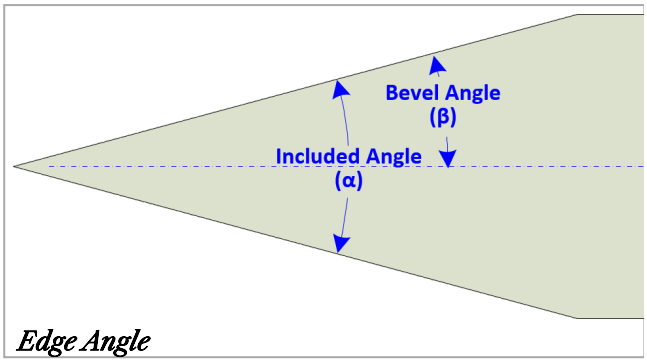
Videos & Presentations

- Tormek Live Sharpening Class - Special - Gardening tools (YouTube video). Wolfgang and Sèbastian from Tormek did a special episode of their sharpening class, focusing on the gardening tools. Learn how to sharpen secateurs, lawn mower blades, a scythe, hedge shears and other tools that you use in the garden!
- Tormek AngleMaster WM-200 (YouTube video)

> **Sharpness Scale** - see Chapter 1.
> **Ongoing maintenance** - see Chapter 4, *Garden Tools*.

Log Splitter Blades

Guidelines shown below are for **Included Angles** (α).



There is a real chance that the user will encounter inclusions in the wood such as nails or old fence wire. Such inclusions, combined with the strong force behind the blade, will quickly dull a blade and may even add damaged areas to the edge.

A damaged blade can be dangerous to the user or others around this machine. There are scenarios easily imagined where the machine could eject a piece of wood in a way to injur those around the area. Further, dislodging a piece stuck to the blade will typically be done in haste, and without removing the force behind the blade, thusly creating a real chance for injury.

The sharpener should consider adding a micro bevel (see Chapter 1) to the edge of this blade. The micro bevel will help reduce the chance of damange to the edge, and also make the blade easier to resharpen.

The sharpener should be quite careful to not overheat the blade when resharpening. This could quickly remove the temper from the blade.

> *The proper function of man is to live, not to exist. I shall not waste my days in trying to prolong them. I shall use my time.*
> Jack London

General Guidelines			
Type	α	Micro bevel	Sharpness
General	30˚	3˚ - 5˚	4

Notes & Comments

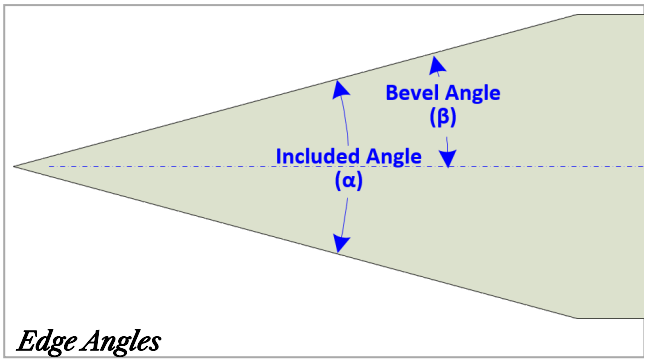
Grind Shape & Experience

The shape of the grind used is a call best made by the tool's use, based on your own experience. Additional notes are available on separate web pages for Grind Profiles (see Chapter 1), and Micro / Secondary Bevels.

Sharpness Scale - see Chapter 1.
Ongoing maintenance - see Chapter 4, *Woodworking Tools*.
Grindstones and Other Sharpening Media - see Chapter 2.

Machetes

Guidelines shown below are for **Included Angles** (α).



Edge Angles

This tool is often sharpened using a machinist's hand file or a sharpening puck (aka, a whetstone) whilst holding the bade in the non-dominant hand. Thusly, the angles are shown as a β angle rather than an α angle.

If using a Tormek, the Extended Universal Support (US-430) is highly recommended.

Gardening is a way that humans and nature come together with the intent of creating beauty.
Tina James

No microbevel is recommended for this tool.

General Guidelines		
Type	α	Sharpness
General Use	20° - 25°	4
Heavy wood cutting	25° - 30°	3

Notes & Comments

Heavy wood cutting
This gives a more durable edge, particularly when the target may have unknown items buried in it (such as nails in a tree).

Grind Shape & Experience
The shape of the grind used is a call best made by the tool's use, based on your own experience. Additional notes are available on separate web pages for Grind Profiles (see Chapter 1), and Micro / Secondary Bevels (see Chapter 1).

Shaping the edge
New machetes should not needed to be reshaped. However, they may need work if a nick is incurred in the blade.

More Information

Videos & Presentations

- How To Sharpen a Machete (YouTube Video), by Machete Specialists. Sharpening a machete is not just about getting it razor sharp; it is about creating an edge that will work best for how you plan to use your machete.

Whenever you sharpen a blade you must choose a balance between sharpness and durability. In this video I talk about blade angles and I explain what I believe to be the best all-around sharpening angle for machetes and discuss other sharpening angles for other types of blades and their uses.

I also demonstrate how I typically sharpen a machete to a sharp but durable edge using two very inexpensive tools.

- How To Sharpen a Machete (YouTube Video), by Burning River Bushcraft. Using a file, a sharpening puck and a leather sharp you will learn how to make your machete razor sharp.

  Also addressed in this video are the activities needed to reshape handles on new machetes to make them more usable.

- How To Sharpen Your Machete: Essential Tips & Techniques | Beginner's Guide (YouTube Video), by Sharpening Supplies. In this video, Tom demonstrates how to sharpen your machete, whether you're in the workshop or out in the field. Learn the best sharpening angles for different tasks, the types of sharpeners to use, and common mistakes to avoid. This guide is perfect for beginners and seasoned users alike.

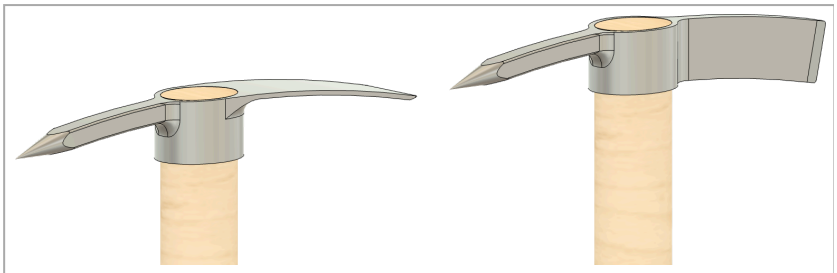
  This video shows a good selection of methods for sharpening, including stones, a Tormek, & a Worksharp.

> **Sharpness Scale** - see Chapter 1.
> **Ongoing maintenance** - see Chapter 4, *Garden Tools*.
> **Grindstones and Other Sharpening Media** - see Chapter 2.

Pick Mattock & Pickax

A **Pick Mattock** is a commonly used tool at the home, and its use is usually followed by the use of some form of pain relief.

These are all commonly called a **pickax**; however there are two separate tools. Both have a pick on one side, but the other side is what differentiates these two.



Pick Mattock (left) & PickAx (right)

- The **pick mattock**'s side opposite the pick is an adze. This is shown in the picture to the right as the left tool.
- The **pickax**'s side opposite the pick is a crude version of an axe. This is shown in the picture to the right as the right tool.

Sharpness Scale

3

The angles for each edge are shown below.

There is a strong liklihood that this tool will be impacting bricks, rocks, or other construction debris. They do not need to be terribly sharp (thusly, the sharpness scale rating of 3). Also, if you miss and hit yourself, you will want to mimimize the damage to your leg.

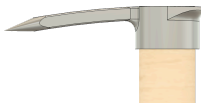
> *A man says a lot of things in Summer he doesn't mean in Winter.*
>
> Patricia Briggs

General Guidelines		
End	**α**	**Range**
Pick *side view*	**25°**	20° - 35°
Adze *side view*	**35°**	30° - 50°
Axe *top view*	**40°**	30° - 50°

Notes & Comments

Pick side view

Be sure to round off the point. A radius around ⅛" is recommended.



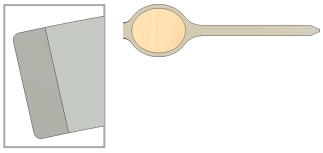
Adze side view

This end is sharpened on the operator's side of the edge angle, just as adze is. The noted angle for **α** is a bevel angle, and should be denoted as **β**; however this was noted this way for convience. (50% an included angle).



As noted in the picture to the right, the corners of the axe end should be rounded off. *(This is a top view of the tool.)*

Axe top view



This end is sharpened on both sides of the edge angle, just as an axe is. The noted angle for **α** is an included angle.

As noted in the picture to the right, the top and bottom corners of the axe end should be rounded off. *(This is a side view of the tool.)*

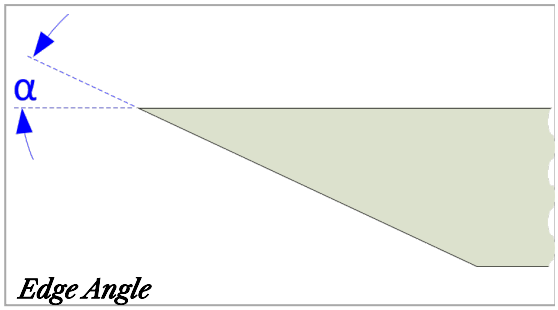
Rounding Off Corners

The comments regarding rounding off the corners on the adze and axe ends relate to the reality that this tool is sure be found impacting stuff which was not the intended target (e.g., a building's side). This is particularly prone to happen towards the end of the working session when the user is tired.

> **Sharpness Scale** - see Chapter 1.
> **Ongoing maintenance** - see Chapter 4, *Garden Tools*.
> **Grindstones and Other Sharpening Media** - see Chapter 2.

Post Hole Diggers

The sharpener should consider sharpening this tool in the outside of the digging blade's curve.



Edge Angle

- When using the tool, the bevel on the edge will push the shovel's blade towards the inside of the hole, and away from the outside edge. This helps to keep the hole from getting too big.
- This is quite a bit easier and a safer way to sharpen.
- Also, this approach is easier as a flat file can be used for the sharpening activity. (*If you opt to sharpen the inside of the curved edge, you will need a half round or round file.*)

> Gardeners learn by trowel and error.
> Anonymous

A 6" smooth cut machinist's hand file (see Chapter 20) is useful to carry in your gardening tools box. Use it to resharpen the shovel as needed throughout the tool's usage for the day.

General Guidelines	
α	Sharpness
45°	3

Notes & Comments

This tool will encounter rocks often when being used. Thusly, the edge need not be any more acute. Also, it does not need to be terribly sharp.

These tools are typically stamped ouf of metals which are not terribly hard. Consider this when selecting sharpening tools: if too much heat is generated in the sharpening activity, this can easily remove whatever temper was added to the metal.

Shaping the edge

Shaping the edge: New shovels I have purchased have an angle (α) of 90°. Therefore, initial shaping of the edge is to be expected.

A machinist's hand file such as a 12-14" bastard file is often sufficient for this task.

If you use an angle grinder, consider using a 120 grit flap disc. A metal grinding wheel may be needed for large-scale shaping. In either case, be sure to not overheat the metal too much: it weakens the metal.

Sharpening the edge

Use a machinist's hand file.

1. Start with a 8-10" medium (or second) cut file.
2. Finish with a 6" smooth cut file, then use this file to remove the burr.

Adding a Depth Scale



Depth scale on the tool's handle

It is recommended that you add a depth scale to the handle of this tool. That will make it easier to determine how deep the hole is without having to use a ruler to measure the depth (and probably dropping the tape measure into the hole). An example is shown to the right (0" is at the tool's cutting edge; 14" is the line at the top of the metal part).

A Sharpie is sufficient for this. Be sure the markings are easy to read when looking down at the hole (e.g., big numbers).

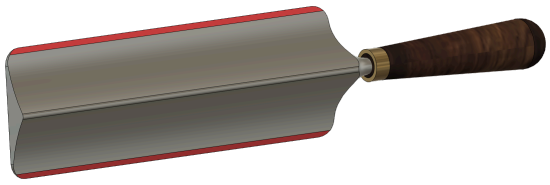
More Information

Books & Papers

- U.S. War Department's TM 9-867 Maintenance and Care of Hand Tools (on the web site).

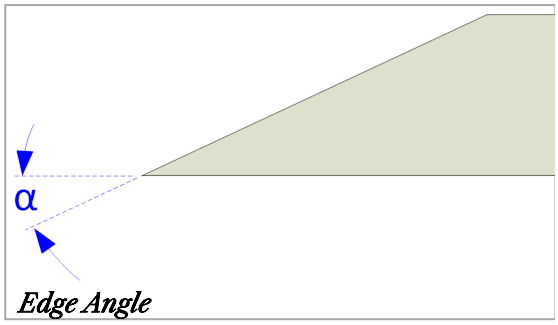
Sharpness Scale - see Chapter 1.
Ongoing maintenance - see Chapter 4, *Garden Tools*.
Grindstones and Other Sharpening Media - see Chapter 2.

Pruning Knife for Trees



Vicomte de Courval's Improved Pruning Knife

The **Pruning Knife** is used by the arborist to prune tree limbs.



Edge Angle

This style of tool was developed by Vicomte de Courval in the late 1800's. The blade's design with a raised rib and weight (2 lbs. 12 oz. to 3 lbs. 6 oz.) concentrated the user's effort for removing larger branches and improving the tree's growth.

Sharpen the outside edges (shown in red in the picture above), and deburr them from the bottom.

A 6" smooth cut machinist's hand file (see Chapter 20) is useful to carry in your gardening tools box. Use it to resharpen the hoe as needed throughout the gardening activity.

My green thumb came only as a result of the mistakes I made while learning to see things from the plant's point of view.
H. Fred Dale

General Guidelines		
α		Sharpness
Softer Woods	Harder Woods	
25°	30°	6

Notes & Comments

Narrower angles are useful for trees with softer wood (e.g., fruit trees), whilst higher angles are useful for trees with harder wood (e.g., ash and oak).

For general use, 30° is recommended.

Historical Notes

Vicomte de Courval's innovations in pruning tools and techniques were highly influential. He emphasized careful pruning to enhance tree health and timber value, demonstrating these methods at agricultural exhibitions in Paris (1861) and London(1862).



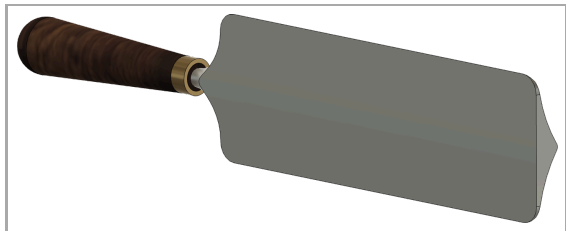
Aborist carrying a Pruning Knife in a leather sheath held over the shoulder

The Back

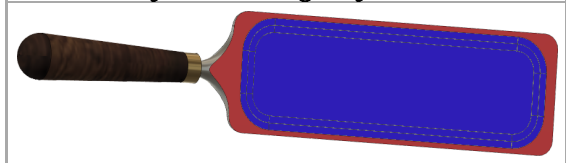
The back side of the blade is where the final sharpening takes place. This is where the burr is removed, and as with chisels, a flattened back will make the arborist's job much easier as it allows the tool to be swung flat against the limb or trunk of the tree.

The bottom picture on the right shows an area in the center of the back where the surface has been relieved below the surface of the back. This is like done on

Japanese chisel and plane blades, and makes the sharpening easier as the surface area which needs to be addressed is significantly smaller. This is denoted in the red and blue colouring: the blue is the relieved area, and the red is the part which needs to be addressed.



Back Side of the Pruning Knife



Back Side of the Pruning Knife with Relief Area

For removing large nicks in the edge, a Tormek grinder or a 12-14" bastard file machinist's hand file will work sufficiently well. Hopefully the arborist has not hit on too large a metal object within the tree.

Using a bench or angle grinder is not recommended as this will surely overheat the tool, removing the temper from the edge. Additionally, the shaping of the edge is difficult to control.

Sharpening the edge

If using a Tormek,

- The SVD-110 Tool Rest jigs is recommended
- The Tormek SG-250 grindstone works well
- Grinding the outside edge using the Tormek's vertical position (with the grindstone rotating towards the edge) is recommended

If you choose to use a machinist's hand file,

1. Start with a 8-10" medium (or second cut) file.
2. Finish with a 6" smooth cut file, then use this file to remove the burr.

Micro bevel Notes: A micro bevel is not recommended: It is not needed.

More Information

Books & Papers

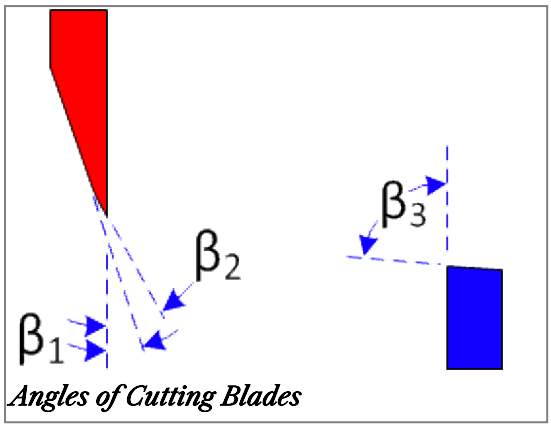
- A Treatise on Pruning Forest and Ornamental Trees (archive.org) (1881), by A. des Cars. This pruning knife is shown on pg. 22.
- The Pruning Manual (archive.org) (1916), by Liberty Hyde Bailey. This pruning knife is shown on pg. 303-305.

Published Articles

- An Historical Review of Artificial Forest Pruning, published in "The Forestry Chronicle", Vol. 13, No. 2, pp. 380 - 395 (June, 1937), by James D. Curtis, M.C.S.F.E.

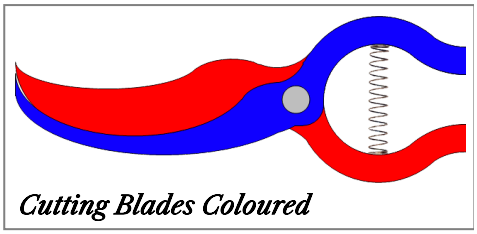
> **Sharpness Scale** - see Chapter 1.
> **Ongoing maintenance** - see Chapter 4, *Garden Tools*.

Secateurs, Bypass Loppers, & Pole Pruners



Angles of Cutting Blades

Secateurs are also known as *Bypass Pruners*, *Hand Pruners*, and *Pruning Shears*. Bypass Loppers are sharpened using the same guidance as Secateurs. Additional information for sharpening Pole Pruners is in the comments section.


Cutting Blades Coloured

Angles are shown in the end views of the upper blade (red) and lower blade (blue).

A 6" smooth cut machinist's hand file (see Chapter 20) is useful to carry in your gardening tools box. Touching up the upper blade (red) may be needed to ensure you have clean cuts, reducing the work on your hands and reducing the risk of damage to the plant.

> *The best tool in the garden is the knowledge of the gardener.*
> Unknown

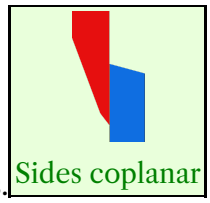
General Guidelines

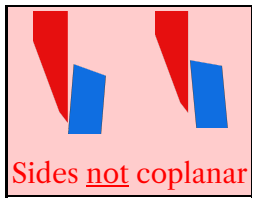
Edge Angle	Angle	Sharpness	Notes
β_1	20°	5	This angle is not terribly critical and probably does not need to be addressed. What I have observed is (generally): $\beta_1 = \beta_2 - 10°$
β_2	**30°**		This angle can be as high as 35°, though that will make cutting the plant harder for thicker pieces (e.g., branches). KJ-45 Projection is the distance the blade projects beyond the end of the KJ-45 jig, and assumes that the sharpener is using the bottom stop.
β_3	*n/a*		This angle (i.e., the lower (blue) blade) could be as low as 80°; however it is not terribly critical. What is important is that the angle is sharp and not rounded over, and that the blade is not corruded with tree sap nor rust. **Pole pruners**: be sure to look at this, especially on the first sharpening. Many lower quality tools need this to be re-shaped, making them work significantly better.

Notes & Comments

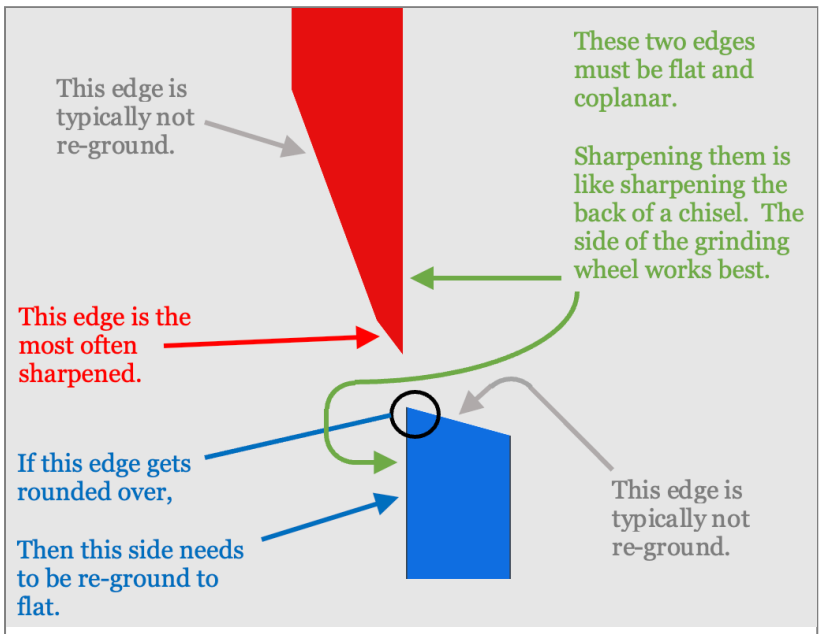
β 1 Grind

A critical aspect when sharpening these tools is that the adjoining sides of the two cutters (the red and blue parts) must be coplanar.





Felco manufactures secateurs for many vendors. Consider following the guidelines noted below for Felco Hand Pruners.



Sharpening Notes for the Secateurs' Edges

Shaping the edge

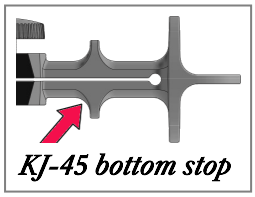
New secateurs and bypass lopers I have purchased have not needed to be reshaped. However, they may need work if a nick is incurred in the blade.

A 12-14" bastard machinist's hand file is often sufficient for reshaping the tool's cutting edge.

If you choose to use an angle grinder, consider using a 120 grit flap disc. A metal grinding wheel may be needed for large-scale shaping. In either case, be sure to not overheat the metal too much: it weakens the metal.

Sharpening the edge

For secateurs, I find that the Tormek works quite well, especially if the blade can be detached from the tool.



KJ-45 bottom stop

Tormek KJ-45 Jig Notes

When using the KJ-45, use the bottom stop (this is shown in the picture to the right, and is indicated using a red arrow). Using the bottom stop is necessary to achieve the sharpening angle for β_2.

Tormek SVM-45 Jig Notes

When using the SVM-45, adding a pivot jig (see Chapter 3) (especially the pin pivot jig) works exceptionally well.



One style of Pivot Jig with the Tormek SVM-45

Notes on Using a Hand File

You can also use machinist's hand files. Start with an 8-10" medium (or second) cut file, and finish with a 6" smooth cut file, then use this file to remove the burr.

Felco Secateurs Notes

The tools needed to remove the blade for sharpening it are:

- 12mm open-end wrench
- 8mm open-end wrench; a similar-sized nut driver is also recommended.

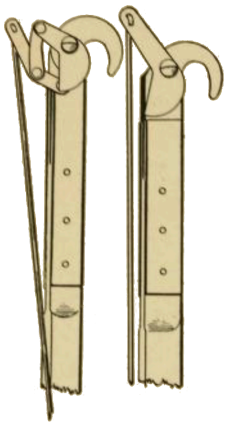
The video below, Cleaning & Sharpening Felco Secateurs For The Gardening Season Ahead, may be useful for the disassembly & re-assembly of the secateurs.



Pole Pruner with Saw Blade



Pole Pruner Cutting Blades



Double Lever & Single Lever Pole Pruner

Pole Pruners

Pole pruners also need to be sharpened to work as expected. The two traditional types are shown in the picture at the bottom left.

The two blades are noted in red & blue in the picture to the left, and are sharpened as noted above. Also, as noted above, the sharpener must ensure the blades remain coplanar.

The video noted below, Pole Pruner Maintenance, is a good reference for the other maintenance activities needed to ensure long life of this tool.

Pole Pruner Maintenance

If the pole pruner has not been maintained before (much less sharpened), you should plan to replace all the attachment screws.

Also, if the parts have been bent (i.e., when using the tool when the blade was dull), you will need to straighten everything out before re-assembly. A bench vise and a dead-blow mallet are useful for this.

Safety Note: Inspect any bent parts to ensure that the part has not received stresses which would weaken the tool and make it dangerous to use. Replacing the tool will be less costly than a doctor's visit.

Pole Pruner - Optional Configurations

Saw Blade

If the pole has a saw blade attached as shown in the picture to the left, the saw blade is sharpened following the instructions for Hand Saws (see Chapter 6).

It is best to remove the saw blade for sharpening; otherwise, the long arm of the pruner will make the process cumbersome.

Chisel End

There was a version of the pole pruner where a chisel blade is attached to the end in lieu of a saw blade. If you are sharpening the chisel blade, the recommended angles are noted in the table below.

$\alpha_{\text{Primary Bevel}}$	30°
$\alpha_{\text{Micro Bevel}}$	+5°

The use of a microbevel allows for fast resharpening / touch-up in the field.

This makes for a rather obtuse angle on the chisel's edge; however this tool will often be used fairly aggressively, and with varying densities of wood.

There may be embedded materials in the wood (e.g., staples, nails, and even fence wire) which will quickly dull the edge. Keeping a machinist's hand file handy is recommended.

More information about chisels is available at the chisels (see Chapter 18) page.

More Information

Videos & Presentations

- Cleaning & Sharpening Felco Secateurs For The Gardening Season Ahead - This short video shows the disassembly and re-assembly of the Felco secateurs.

  The presenter in the video uses the Felco screwdriver tool for removing the screws. I prefer to use a 12mm open-end wrench and an 8mm open-end wrench.

- Pole Pruner Maintenance (YouTube video). This was produced by an arborist who noted,

  > *If you take care of this tool, you will produce more with less effort. These few tips can go a long way to help your company be effective and professional. A short video that explains just how to take care of this valuable tool. A pole pruner is great but a dull or poorly working tool is a pain in the @%% !*

- Tormek Live Sharpening Class - Special - Gardening tools (YouTube video). Wolfgang and Sèbastian from Tormek did a special episode of their sharpening class, focusing on the gardening tools. Learn how to sharpen secateurs, lawn mower blades, a scythe, hedge shears and other tools that you use in the garden!

- Tormek AngleMaster WM-200 (YouTube video)

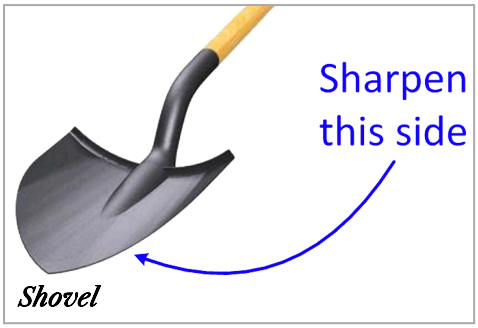
Web Sites

- CB posted a design for using a Collar Pivot Jig (indexjigs.html) for the the Tormek SVM-45 jig in 2018 on the Tormek Forum. This is shown in the picture at the top of this page.

  More pictures are also shown on the Jigs, Fixtures, & Modifications (see Chapter 3) page.

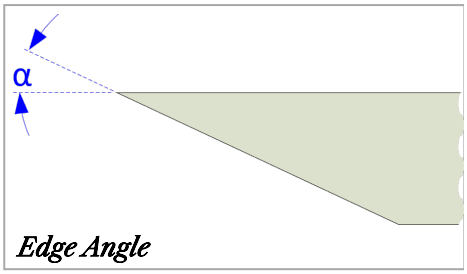
> **Sharpness Scale** - see Chapter 1.
> **Ongoing maintenance** - see Chapter 4, *Garden Tools*.
> **Grindstones and Other Sharpening Media** - see Chapter 2.

Shovels



Shovel

This guidance also covers *Gardening Trowels* & *Spades*.



Edge Angle

Sharpening the outside (the bottom / convex side) edge will push the shovel's blade towards the inside of the hole, and away from the outside edge. This helps to keep the hole from getting too big.

Also, this approach is easier as a flat file can be used for the sharpening activity.

A 6" smooth cut machinist's hand file (see Chapter 20) is useful to carry with you.

The glory of gardening: hands in the dirt, head in the sun, heart with nature. To nurture a garden is to feed not just the body, but the soul.
Alfred Austin

General Guidelines		
Type	α	Sharpness
Gardening Trowels	40° - 45°	3
When used for weeding in hard, clean dirt	30°	3
Shovels (General)	40° - 45°	3
Shovels with Sawtooth Digging Edges	40° - 45°	3
Shovels with Sawtooth Sides	40° - 45°	3
Spades	40° - 45°	3
Trenching Shovels	35°	3

Notes & Comments

Gardening Trowels

Gardening Trowels are usually made by stamping a piece of metal, leaving an α angle of 90°. As this tool is often used in soil which is already loosened, a sharper angle is not typically necessary. But if desired, 40° to 45° is recommended.

When used for weeding in hard, clean dirt

When weeding in hard dirt, a sharp angle can make piercing the surface much easier. But, a sharp angle like this will dull much easier, especially if the tool encounters rocks in the soil.

Shovels (General)

If the soil is very rocky, then a more obtuse angle like 60° or even 90° may be needed. Just be aware that these will take more work to use.

Shovels with Sawtooth Digging Edges

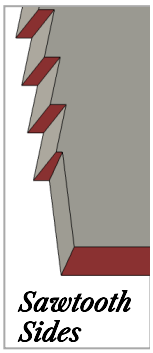
Some shovels have sawteeth on the digging edges, making them better for digging in harder soils. This is a tougher one to sharpen as the points need to remain strong enough to penetrate the soil. I recommend not modifying this shovel.



Shovels with Sawtooth Sides

Some shovels have Sawtooth sides, making them better for digging in root-heavy areas. The bottom can be sharpened as noted, but the sides should be handled separately.

The edges of each jag which penetrate the soil can be sharpened, leaving the sides at 90°. This is shown in the picture to the right which shows the side of the shovel's blade from the back. The red areas are the part sharpened.



Spades

As with shovels, consider the soil in which the tool will be used. A 40° to 45° angle is a good compromise.

Trenching Shovels

These shovels get used for digging irrigation, electrical and plumbing trenches. The sharper angle makes it easier to slide the tool across the trench being dug.

These tools are typically stamped ouf of metals which are not terribly hard. Consider this when selecting sharpening tools: if too much heat is generated in the sharpening activity, this can easily remove whatever temper was added to the metal.

Shaping the edge

Shaping the edge: New shovels I have purchased have an angle (α) of 90°. Therefore, initial shaping of the edge is to be expected.

A machinist's hand file such as a 12-14" bastard file is often sufficient for this task.

If you use an angle grinder, consider using a 120 grit flap disc. A metal grinding wheel may be needed for large-scale shaping. In either case, be sure to not overheat the metal too much: it weakens the metal.

Sharpening the edge

Use a machinist's hand file.

1. Start with a 8-10" medium (or second) cut file.
2. Finish with a 6" smooth cut file, then use this file to remove the burr.

More Information

Books & Papers

- U.S. War Department's TM 9-867 Maintenance and Care of Hand Tools (on the web site).

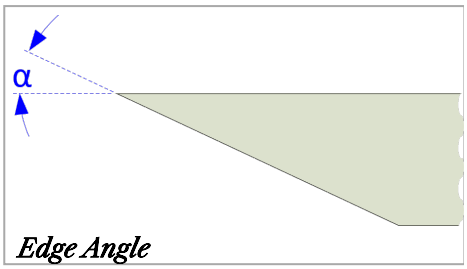
Sharpness Scale - see Chapter 1.
Ongoing maintenance - see Chapter 4, *Garden Tools*.
Grindstones and Other Sharpening Media - see Chapter 2.

Square Shovels



Square Shovel

Sharpening the top edge enables the shovel's back to lie flat on the surface, getting all the material into it (e.g., mulch sitting on a concrete drive, or gravel in the bed of your truck).



Edge Angle

A 6" smooth cut machinist's hand file (see Chapter 20) is useful to carry in your gardening tools box. Use it to resharpen the shovel as needed throughout the tool's usage for the day.

> *There is no gardening without humility. Nature is constantly sending even its oldest scholars to the bottom of the class for some egregious blunder.*
> Alfred Austin

General Guidelines	
α	Sharpness
40° - 45°	3

Notes & Comments

Shaping the edge

New shovels I have purchased have an angle (α) of 90°. Therefore, initial shaping of the edge is to be expected.

A machinist's hand file such as a 12-14" bastard file is often sufficient for this task.

If you use an angle grinder, consider using a 120 grit flap disc. A metal grinding wheel may be needed for large-scale shaping. In either case, be sure to not overheat the metal too much: it weakens the metal.

Sharpening the edge

Use a machinist's hand file.

1. Start with a 8-10" medium (or second) cut file.
2. Finish with a 6" smooth cut file, then use this file to remove the burr.

More Information

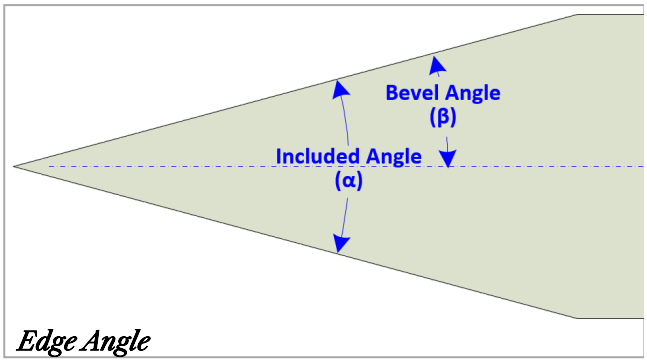
Books & Papers

- U.S. War Department's TM 9-867 Maintenance and Care of Hand Tools (on the web site).

Sharpness Scale - see Chapter 1.
Ongoing maintenance - see Chapter 4, *Garden Tools*.

Sod Lifters

Sharpening this tool with the same angle on the top as the bottom helps ensure the tool does not drive up or down when pushing it "horizontally" under the sod.



> *A flower is an educated weed.*
> Luther Burbank

A 6" smooth cut machinist's hand file (see Chapter 20) is useful to carry in your gardening tools box. Use it to resharpen the shovel as needed throughout the tool's usage for the day.

General Guidelines			
α	β_{Top}	β_{Bottom}	Sharpness
45°	22.5°	22.5°	5

Notes & Comments

Being well sharpened will help this tool be easier to use.

These tools are typically stamped ouf of metals which are not terribly hard. Consider this when selecting sharpening tools: if too much heat is generated in the sharpening activity, this can easily remove whatever temper was added to the metal.

Shaping the edge

Shaping the edge: New shovels I have purchased have an angle (α) of 90°. Therefore, initial shaping of the edge is to be expected.

A machinist's hand file such as a 12-14" bastard file is often sufficient for this task.

If you use an angle grinder, consider using a 120 grit flap disc. A metal grinding wheel may be needed for large-scale shaping. In either case, be sure to not overheat the metal too much: it weakens the metal.

Sharpening the edge

Use a machinist's hand file.

1. Start with a 8-10" medium (or second) cut file.
2. Finish with a 6" smooth cut file, then use this file to remove the burr.

More Information

Books & Papers

- U.S. War Department's TM 9-867 Maintenance and Care of Hand Tools (on the web site).

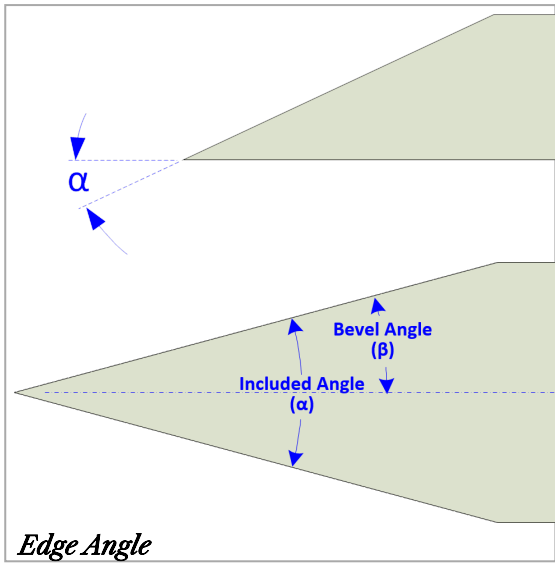
Sharpness Scale - see Chapter 1.
Ongoing maintenance - see Chapter 4, *Garden Tools*.
Grindstones and Other Sharpening Media - see Chapter 2.

Spud Bar

The edge needs to be sharp enough so that it can be used to cut through roots with reasonable ease. The operator should be able to use it without overexerting themselves (*and risking injury to themselves or others*).

There are at least two variations to the cutting end as shown in the graphics to the right. In either case, the angle is denoted by α.

> *Ask the plants of the earth, and they will teach you.*
> Job 12:8a



Edge Angle

General Guidelines	
α	Sharpness
20° - 25°	4

Notes & Comments

20° - 25° Grind

If the area where this tool is being used has a lot of stones in it, the α may need to be increased. Something between 20° and 30° is recommended.

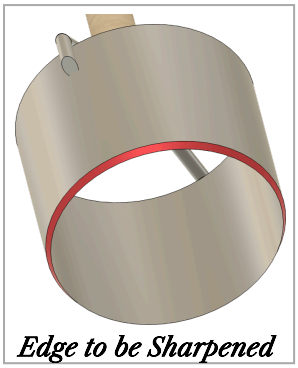
Alternatively, the sharpness can be decreased to 3, with a bit of a rounded-over edge.

Grind Shape & Experience

The shape of the grind used is a call best made by the tool's use, based on your own experience. Additional notes are available on separate web pages for Grind Profiles (see Chapter 1), and Micro / Secondary Bevels (see Chapter 1).

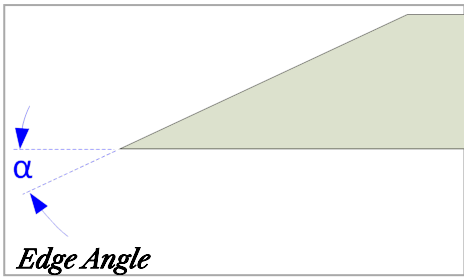
> **Sharpness Scale** - see Chapter 1.
> **Ongoing maintenance** - see Chapter 4, *Garden Tools*.
> **Grindstones and Other Sharpening Media** - see Chapter 2.

Strawberry Pruner



Edge to be Sharpened

A **Strawberry pruner** is used to easily remove the strawberry plant's runners. As Liberty Hyde Bailey noted, it (cuts) "*the runners from strawberry plants, one thrust of the implement leaving the hill in proper size and shape.*"



I recommend sharpening the outside perimeter of the cutting edge (the red part in the picture to the right). This is much easier and safer than trying to sharpen the inside edge.

A 6" smooth cut machinist's hand file (see Chapter 20) is useful to carry in your gardening tools box. Use it to resharpen the strawberry pruner as needed throughout the gardening activity.

The greatest gift of the garden is the restoration of the five senses.
Hanna Rion

General Guidelines	
α	Sharpness
35° - 45°	5

Notes & Comments

35° - 45° Grind

Most gardeners will not plant strawberries in rocky soil, so a sharper angle (towards 35°) will make this easier to use. Any angle in the recommended range will make the tool easier to use than the 90° which tools are usually shipped with.

This tool is one I first encountered in The Pruning Book by Lee Rich. Lee merely noted that it was better explained in The Pruning Manual by L.H. Bailey. (Both books are noted below in the More Information section.)

Shaping the edge

These tools will certainly be old. The metal in the cutting edge will probably be high carbon steel, so be very careful if using any grinder for changing the shape of the edge. If it gets too hot, the temper of the metal can be easily lost.

Sharpening the edge

Use a machinist's hand file.

1. Start with a 12-14" bastard file (as necessary).
2. Next, continue with a 8-10" medium (or second) cut file.
3. Finish with a 6" smooth cut file, then use this file to remove the burr.

More Information

Books & Papers

- The Pruning Book (2010), by Lee Rich
- The Pruning Manual (archive.org) (1930), by L.H. Bailey. Link is to an online ebook copy.

  Figure 220 from Bailey's book is shown to the right. I believe that the insert to the image (shown on the right) is possibly denoting that a second handle is sometimes attached to the vertical shaft to make this tool easier to use. This is probably needed as one cannot step onto the top of the cutter as with a bulb planter.

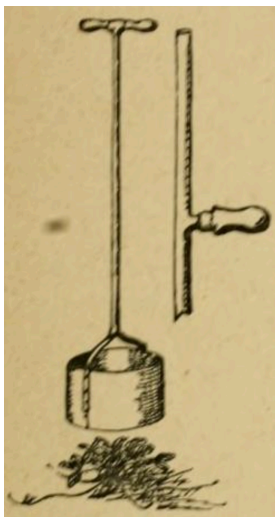


Fig. 220. Strawberry Pruner

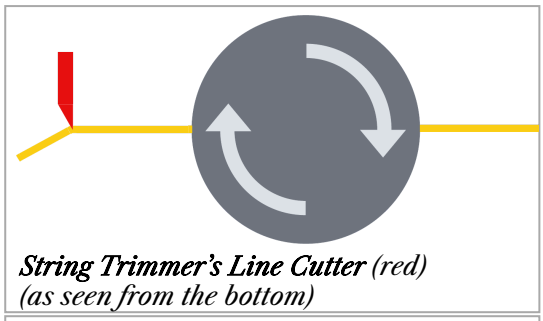
Sharpness Scale - see Chapter 1.
Ongoing maintenance - see Chapter 4, *Garden Tools*.

String Trimmer Line Cutter

String trimmers often have a line cutter incorporated into the cutter head to cut the newly extended string line. In the picture to the right,

- the spinning head is grey,
- the strings are yellow, and
- the cutter is red

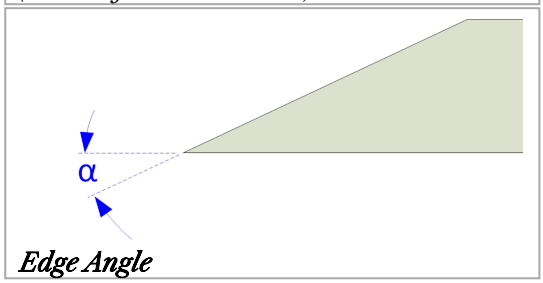
Use a machinist's hand file for the sharpening process to ensure the blade's temper is not lost.



String Trimmer's Line Cutter (red)
(as seen from the bottom)

> *Sharp tools are important, so I sharpen them every day.*
>
> Yutaka Mogami, 3rd generation master of Edo sashimono

Guidelines shown below are for **Included Angles** (α).



Edge Angle

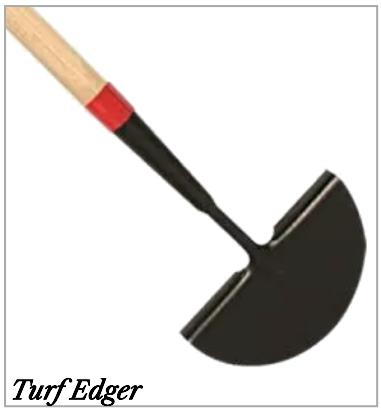
General Guidelines	
α	**Notes**
30°	As shown in red in the picture above right, sharpen the outside of the blade.

Notes & Comments

Grind Shape & Experience

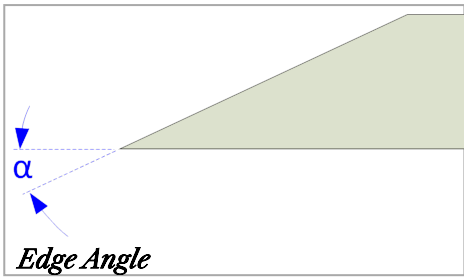
The shape of the grind used is a call best made by the tool's use, based on your own experience. Additional notes are available on separate web pages for Grind Profiles (see Chapter 1), and Micro / Secondary Bevels (see Chapter 1).

Turf Edger



Turf Edger

Guidelines shown below are for **Included Angles** (α).



> How deeply seated in the human heart is the liking for gardens and gardening.
> Anonymous

General Guidelines	
α	Sharpness
15°	7

Notes & Comments

If the turf being edged has a lot of stones in it, the α may need to be increased. Something between 15° and 35° is recommended.

Grind Shape & Experience

The shape of the grind used is a call best made by the tool's use, based on your own experience. Additional notes are available on separate web pages for Grind Profiles (see Chapter 1), and Micro / Secondary Bevels (see Chapter 1).

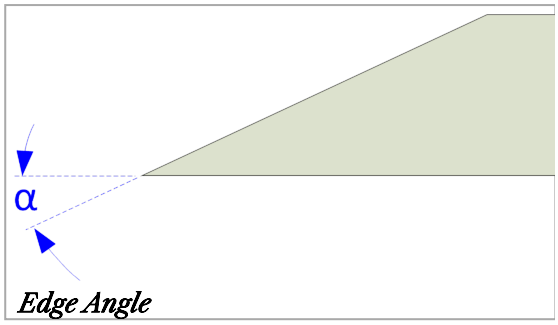
Sharpness Scale - see Chapter 1.
Ongoing maintenance - see Chapter 4, *Garden Tools*.
Grindstones and Other Sharpening Media - see Chapter 2.

Japanese Gardening Hoe & Tiller



The Japense style of Gardening Hoe & Tiller is sometimes called a hand mattock. The tool is the same in either case.

Sharpen the outside edge, and deburr the inside edge. This is noted in the picture to the left.



Unlike a garden hoe, this does not set the angle for the tool's usage in a way as to make the tool's use problematic.

A 6" smooth cut machinist's hand file (see Chapter 20) is useful to carry in your gardening tools box. Use it to resharpen the hoe as needed throughout the gardening activity.

A micro bevel can be added in the field by the gardener for quick resharpening. Even if the tool was sharpened in the shop using a Tormek, the gardener could use a machinist's hand file for a quick touch-up.

> *When a garden is used as a place to pause for thought, that is when a Zen garden comes to life. When you contemplate a garden like this it will form as lasting impression on your heart.*
> Muso Soseki

General Guidelines		
α	Micro bevel	Sharpness
30°	+5°	5

Notes & Comments

30° Grind

The Tormek SG-250 grindstone works well for sharpening this tool. Grinding the outside edge using the Tormek's vertical position (with the grindstone rotating towards the edge) is recommended.

The inside edge will need to be deburred using a machinist's hand file.

Shaping the edge

Japanese gardening tools are typically made from high-carbon steel which is not terribly hard. When this is combined with an acute angle like 30°, it is easy to damage the edge.

Changing this tool to have a higher angle like 45° is not recommended. Instead, the gardener should use a hand axe (aka, a hatchet) for work in the garden which requires heavy chopping or where the blade could come into contact with hard objects such as gravel. These could impart significant damage to the blade of this tool.

For removing large nicks in the edge, a Tormek grinder or a 12-14" bastard file machinist's hand file will work sufficiently well. Experience has shown that either of these approaches works quite well in

removing nicks from the edge after my wife or children have used the tool.

Using a bench or angle grinder is not recommended as this will surely overheat the tool, removing the temper from the edge. Additionally, the shaping of the edge is difficult to control.

Sharpening the edge

If using a Tormek, the Tormek jigs used for holding wood plane blades work well for holding this tool. Also, the Tormek SG-250 grindstone works well for sharpening this tool.

If you choose to use a machinist's hand file,

1. Start with a 8-10" medium (or second cut) file.
2. Finish with a 6" smooth cut file, then use this file to remove the burr.

Micro bevel Notes:

The micro bevel (see Chapter 1) makes the resharpening of this tool easier. If you sharpen the tool using a machinist's hand file, this is recommended. It is less critical if you use a Tormek grinder for the sharpening.

More Information

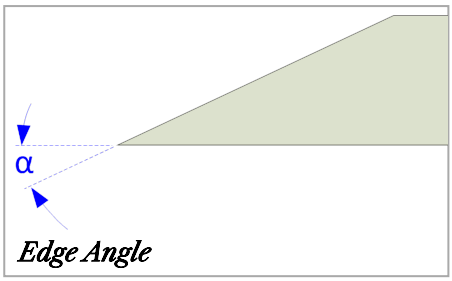
> **Sharpness Scale** - see Chapter 1.
> **Ongoing maintenance** - see Chapter 4, *Garden Tools*.

Hori Hori Gardening Knives



Hori Hori Gardening Knife

The Japanese **Hori Hori Gardening Knives**, also known as Soil Knives, are used in the garden for many activities, including digging, cutting, weeding, & planting. ("Hori hori" means "to dig" in Japanese.)



Guidelines shown below are for **Included Angles** (**α**). The two edges could be sharpened differently, but that is not typically done.

I have never had so many good ideas day after day as when I worked in the garden.
John Erskine

If one side has a serrated edge, and you wish to keep it that way, consult the page on Serrated Edge Kitchen Knives (see Chapter 10).

There can be a debate about how sharp the hori hori knife should be. Notes regarding this are below in the **Notes & Comments** section.

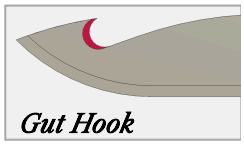
General Guidelines		
α	**Micro bevel**	**Sharpness**
20°	+5°	3 to 5

Notes & Comments

The inside edge will need to be deburred using high grit sandpaper, a machinist's hand file, or a sharpening stone.

The use of a micro/secondary bevel (see Chapter 1) makes the re-sharpening easier and faster, particularly if done in the field.

Note: Some blades have a hooked blade used for cutting twine. This is similar to a hunting knive's gut hook used splitting the skin on a game animal when butchering in the field. Sharpening this concave edge requires a round slip stone or sandpaper wrapped around a dowel rod. This gut hook should probably be sharper so that the twine can be easily sliced (i.e., towards a sharpness of a 5), even if the rest of this tool is not as sharp.



Gut Hook

How Sharp Should a Hori Hori Knife Be?

The gardener needs to decide how sharp the hori hori knife should be based on activities for which the tool will be used. Some of the decision criteria worth considering are outlined below.

Not So Sharp

If the gardener wants to use the hori hori knife for these activities, then making it less sharp is recommended.

- **Planting seeds or seedlings into rocky soil:** When the gardener is planting seeds or plants into ground which may be rocky or have other debris / artifacts (a pot of gold maybe?), then the hori hori knife's blade will most likely get damaged. Having it too sharp will make this more probable and more easily damaged.

Sharpness Scale 3

- **Hacking away at woody plants:** When the gardener is using this tool to hack away at woody plants such as berry canes, a very sharp edge could be damaged. This is not a recommended activity for this tool, but it does happen.

Very Sharp

If the gardener wants to use the hori hori knife for these activities, then making it quite sharp is recommended.

Sharpness Scale 5

- **Propagating plants by division**: examples of the plants which are propagated by division include hostas, irises, lilies, and sedum. Having a sharp blade to perform these activities is key to minimizing damage to those plants when splitting them apart.
- **Cutting back roots when repotting**: Plants which are pot-bond often have roots running in ways the gardener needs to prune back so that the plant can thrive. Many bonsai activities fall in to this category. A sharp blade is needed.
- **Pruning back hard**: Cutting back plants like switchgrass is certainly easier when using a very sharp tool. And using a sharp blade to do this reduces the effort needed, which should reduce the potential for injuring the gardener.

Cautions: depending on how the gardener uses the tool's sheath for encasing the blade, having a very sharp blade makes it easy for the gardener to:

1. Damage the sheath when putting the tool away. This is a real issue as many sheaths are not heavy duty and easily damaged.
2. Cut themself whilst reaching around to put the tool away.



Morakniv knife

Alternatively, the gardener could use a different tool such as a fixed blade knife like a Morakniv or Bowie knife for these activities.

Sharpening the Edge

Preferred Approach: Using a machinist's hand file

If you choose to use a machinist's hand file,

1. Hold the blade in a bench vise. This is the most secure and safe method.
2. Start with a 8-10" medium (or second cut) file.
3. Finish with a 6" smooth cut file.
4. Use some 320 - 400 grit sandpaper to remove the burr.

Adding a 5˚ micro bevel is a very useful approach when using a machinist's hand file to sharpen the hori hori knife.

If you need to sharpen the serrated edge; a round file can help with that endeavour.

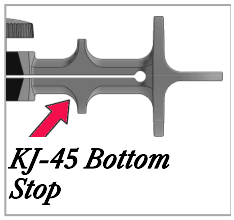
I prefer this method as it is fast and easy, allowing me to get back to gardening sooner.

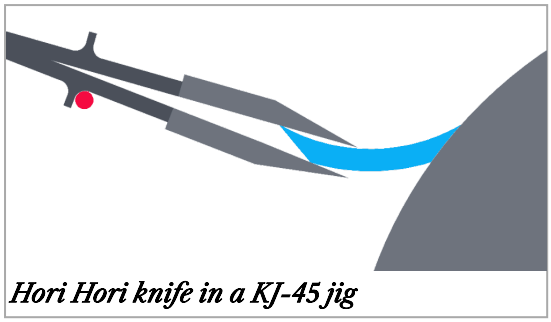
Using a Tormek

Grindstone: The Tormek SG-250 grindstone works well for sharpening this tool.

Jig: The KJ-45 jig can hold this tool acceptably, but you need to use the bottom stop (as indicated in the picture to the right). This makes setting the angle far easier.

Because the blade is curved, a platform jig will probably not work well, and the resulting edge will be unevenly ground. This is not recommended.




Hori Hori knife in a KJ-45 jig

USB Position: Grinding the outside edge using the Tormek's horizontal position (with the grindstone rotating away from the edge) is recommended. This is necessary as the angle is pretty steep due to the curvature of the blade. My experience trying to use the vertical position for the USB caused the blade to be grabbed and just was not a good idea.

The picture to the left shows a hori hori knife (blue) being held by a KJ-45 knife jig. The red dot is the USB.

Note: Because the blade is curved, the KS-123 does not work for this application.

Using a bench or angle grinder

Using a bench or angle grinder is not recommended as this will surely overheat the tool, removing the temper from the edge. Additionally, the shaping of the edge is difficult to control.

Micro Bevel Notes

The micro bevel makes the resharpening of this tool easier. If you sharpen the tool using a machinist's hand file, this is recommended. It is less critical if you use a Tormek grinder for the sharpening.

More Information

Web Sites

- Hori Hori Explained: The Best Japanese Gardening Knife Guide (gardenninja.co.uk) - the BBC's Lee Burkhill explains a lot about these tools, and has some great videos on how to use them.

Videos & Presentations

- Hori Hori Japanese Gardening Knife Guide - The Garden Ninja, Lee Burkhill, shows you how to use a Hori Hori Japanese gardening knife.

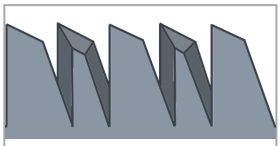
> **Sharpness Scale** - see Chapter 1.
> **Ongoing maintenance** - see Chapter 4, *Garden Tools*.
> **Grindstones and Other Sharpening Media** - see Chapter 2.

Japanese Folding Saw for Gardening

The Japanese folding saw used for gardening is not one I would try to re-sharpen for many reasons.

1. The Japanese saw blade has a tooth shape which is quite complex. The blade will typically have multiple angles cut into each individual tooth, and these can change across the saw's length.

A 3rd or 4th angle in a single tooth is not uncommon.



Blade's teeth, viewed from the side

2. The blade on the Silky brand of Japanese gardening saws have a shape where the sides are not straight from base to top. As depicted in the picture to the right,

- the center of the blade is thinner than the top, and
- the cutting edge of the teeth (bottom in this picture) is wider than those two.

This helps make the saw work well, but it would make re-sharpening the blade more difficult.

Other brands may have the same style of shape.



Silky Blade, viewed from the end

3. Additionally, it is common for these saw blades to have impulse hardened teeth, making it virtually impossible to use a machinist's file to re-sharpen them. Even diamond cards will not work.

Silky in New Zealand have a YouTube video (see below) which discusses the difference between those blades which can be re-sharpened, vs those which cannot.

Saw blades which have this marking cannot be re-sharpened for all the reasons noted above.

This can also make the teeth brittle.



Impulse-Hardening

Gardening is an exercise in optimism. Sometimes, it is a triumph of hope over experience.
Marina Schinz

Don Williams at The Barn at White Run was successful using a diamond-shaped, aluminum oxide, “India” stone. Whilst most simply replace the blade, resharpening a blade is apparently possible.

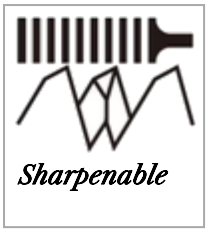
Saw Sharpening Notes

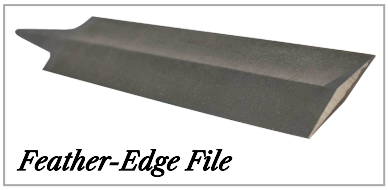
Saw blades with the marking shown to the left can be resharpened.

If you want to pursue sharpening this type of saw, these notes may be of help.

Note to the sharpener: If you do choose to sharpen these saws, be sure you also understand what the **set** needs to be. It is common for there to be no set; instead the changing width of the teeth accomplishes the same objective.

When sharpening these saws, a feather-edge file is needed. Such files are quite thin and are able to fit into the small space between this saw's teeth.



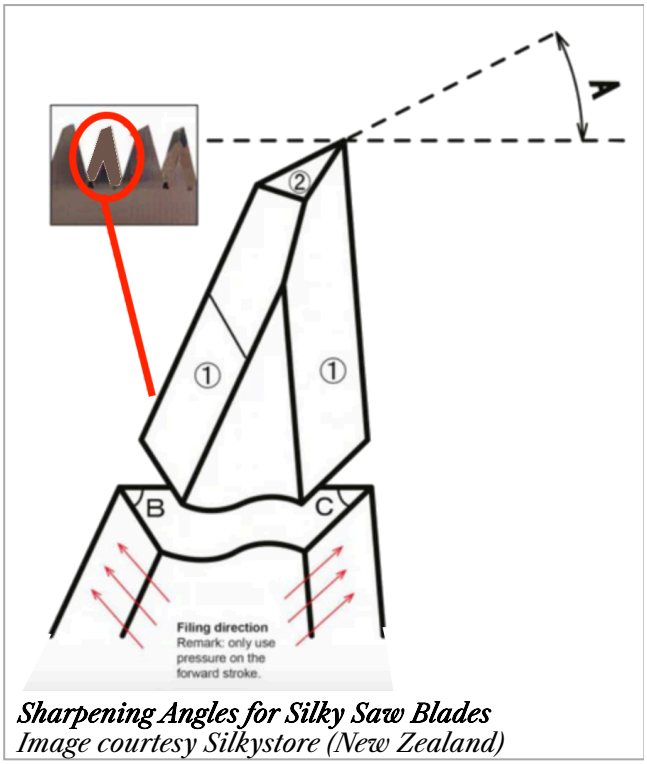


Feather-Edge File

The various angles for resharpenable Silky blades are shown in the table at the left. These correlate with the picture shown to the right.

General Guidance

The general guidance given is that the sharpener can file the ends of the teeth 2 or 3 times before the sides need to be filed. (In the picture to the right, the ends of the teeth are noted as ②, and the sides are noted as ①.)



Sharpening Angles for Silky Saw Blades
Image courtesy Silkystore (New Zealand)

Other vendors' saw blades will have similar measurements. Their tables will need to be consulted for the sharpening activity.

Product	Angle		
	A	B	C
Genki Temagari 500	27°	50°	50°
Hayauchi	21°	50°	50°
Hayate	33°	45°	40°
Ibuki	21°	50°	50°
Katanaboy	27°	50°	50°
Natanoko	27°	50°	55°
Sugoi	33°	45°	40°

More Information

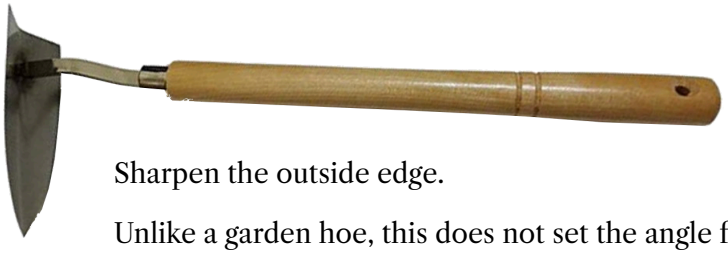
Videos & Presentations

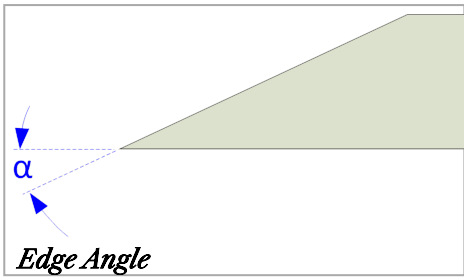
Sharpening a Silky Saw (YouTube video).

Which Silky Saws can be sharpened? (YouTube video).

Ongoing maintenance - see Chapter 4, *Garden Tools*.

Japanese Trenching Hoe





Sharpen the outside edge.

Unlike a garden hoe, this does not set the angle for the tool's usage in a way as to make the tool's use problematic.

Japanese gardens ask that you go beyond the garden spiritually, that you look at the garden not merely as an object but also as a path into the realms of spirit.
Makoto Ooka

A 6" smooth cut machinist's hand file (see Chapter 20) is useful to carry in your gardening tools box. Use it to resharpen the hoe as needed throughout the gardening activity.

General Guidelines

α	Micro bevel	Sharpness
30°	+5°	5

Notes & Comments

30° Grind

Adding a micro bevel (see Chapter 1) to the cutting edge makes resharpening this tool easier.

I've not found a Tormek jig which can assist with sharpening this tool. The sharpener will need to do the work with a machinist's hand file.

Shaping the edge

Japanese gardening tools are typically high-carbon steel, and a 12-14" bastard file machinist's hand file will work sufficiently well. Experience has shown that this style of hand file also works quite well in removing nicks from the edge after my wife or children have used the tool.

Using a bench or angle grinder is not recommended as this will surely overheat the tool, removing the temper from the edge. Additionally, the shaping of the edge is difficult to control.

Sharpening the edge

Use a machinist's hand file.

1. Start with a 8-10" medium (or second) cut file.
2. Finish with a 6" smooth cut file, then use this file to remove the burr.

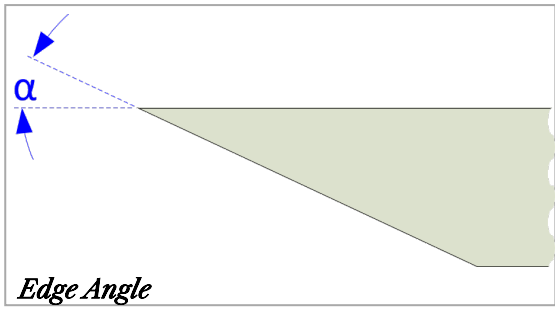
More Information

Sharpness Scale - see Chapter 1.
Ongoing maintenance - see Chapter 4, *Garden Tools*.

Japanese Weeding Sickle



The **Weeding Sickle** is sharpened by grinding the outside edge (the side of the blade's edge not shown in the picture to the left). Unlike a garden hoe, this tool is swung differently. Thusly, grinding on the outside of the edge does not set make the tool's use problematic.



Lee Valley Tools sells a **Yankee Weeder** which is much like this, however the grind is on the inside edge. The α angle should be the same; however the Tormek KJ-45 & SVM-45 jigs will not work to sharpen this tool.

A 6" smooth cut machinist's hand file (see Chapter 20) is useful to carry in your gardening tools box. Use it to resharpen the tool as needed throughout the gardening activity.

Gardens bring us into contact with the cycles and irrefutable laws of nature, teaching us indelible lessons about ourselves and about the messy, difficult, and beautiful processes of living.
Cait Johnson

General Guidelines	
α	Sharpness
30°	5

Notes & Comments

30° Grind

The edges will need to be deburred using a very fine machinist's hand file, or it can be honed using the honing wheel on the Tormek.

Tormek Notes

The Tormek SG-250 grindstone works well for sharpening this tool.

If grinding this tool on the Tormek, grind the outside edge using the Tormek's vertical position (with the grindstone rotating towards the edge).

Shaping the edge

Japanese gardening tools are typically made from high-carbon steel which is not terribly hard. When this is combined with an acute angle like 30°, it is easy to damage the edge.

Changing this tool to have a higher angle like 45° is not recommended. Instead, the gardener should use a different tool, especially where the blade could come into contact with hard objects such as gravel. These could impart significant damage to the blade of this tool.

For removing large nicks in the edge, a Tormek grinder or a 12-14" bastard file machinist's hand file will work sufficiently well. Experience has shown that either of these approaches works quite well in removing nicks from the edge after my wife or children have used the tool.

One common problem is that the pointed end of the cutting edge gets rounded over. If this happens, the back side will need to be reshaped to get the end back to a point. The side needing to be ground is shown to the right with the red arrow. The side of the tool is flat ground, keeping the edge angles as they were originally made.



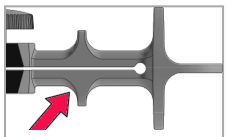
Point which gets rounded over

There is a Tormek video on YouTube, Tormek Live Sharpening Class - Part 15. Repair a damaged knife, which outlines such reshaping activities quite well.

This may seem an onerous task, but it only takes a few minutes, and the usefulness of the tool will be maintained.

Using a bench or angle grinder is not recommended as this will surely overheat the tool, removing the temper from the edge. Additionally, the shaping of the edge is difficult to control.

Sharpening the edge



KJ-45 Bottom Stop

If using a Tormek with the KJ-45 jig, the bottom stop is recommended (as indicated in the picture to the left). This makes setting the angle easier.

The picture on the right shows a Japanese weeding sickle being sharpened on a Tormek (the blue piece behind the grinding wheel is a drip tray).



KJ-45 attached to a Japanese Weeding Sickle

If you choose to use a machinist's hand file,

1. Start with a 8-10" medium (or second cut) file.
2. Finish with a 6" smooth cut file, then use this file to remove the burr.

Micro bevel Notes:

A micro bevel (see Chapter 1) could make the resharpening of this tool easier if resharpened away from the other sharpening tools. Even if the tool was sharpened in the shop using a Tormek, the gardener could use a machinist's hand file for a quick touch-up. In general though, it is not needed on this tool.

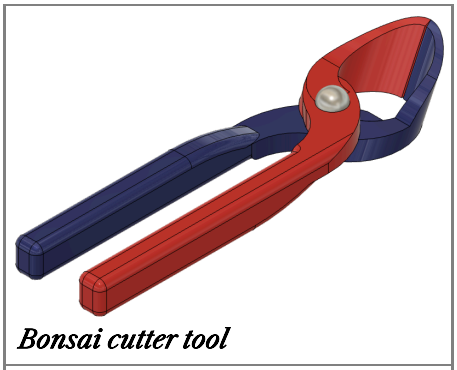
More Information

Videos & Presentations

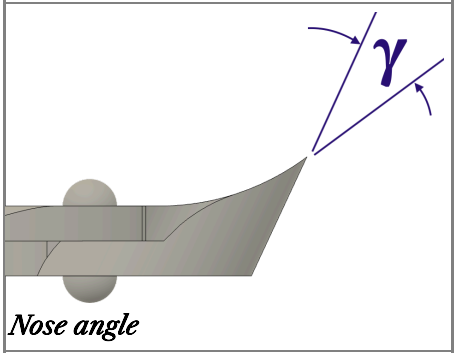
- **Tormek's Videos**
  - Tormek Live Sharpening Class - Part 15. Repair a damaged knife (YouTube video). Wolfgang and Sèbastian from Tormek show you how you can repair damaged knife on your Tormek sharpening system If your knife has a chipped edge, a broken tip, or if it has started rusting, you can often repair the knife and make it as good as new.

Sharpness Scale - see Chapter 1.
Ongoing maintenance - see Chapter 4, *Garden Tools*.

Bonsai Cutters



Bonsai cutter tool

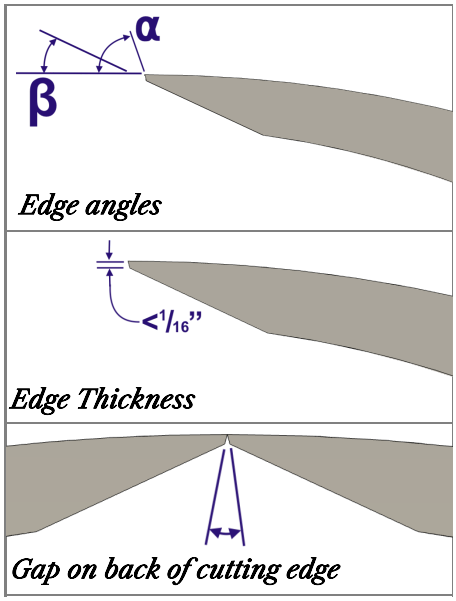


Nose angle

Guidelines shown below are for a number of angles:

α is a primary angle on the nose of the cutters. This is the angle generally sharpened first.

Once this ground surface gets to be too wide (> 1.5mm / $^{1}/_{16}$"), the angle represented by **β** will need to be re-ground.



Edge angles

Edge Thickness

Gap on back of cutting edge

As noted in the bottom picture on the right, there needs to be a gap between the cutter edges on the inside. They should close tightly on the outer edge (top in this picture).

β is a secondary angle on the nose of the cutters.

γ is an angle which will probably not need to be adjusted unless the tool is damaged. The best way to address this point, is to grind on the curved edge.

> *The object is not to make the tree look like a bonsai, but to make the bonsai look like a tree.*
> John Naka

General Guidelines				
Type	α	β	γ	Sharpness
Angled Cutters	75°	20°	30°	5
Knob / Root Cutters	75°	20°	90°	5

Notes & Comments

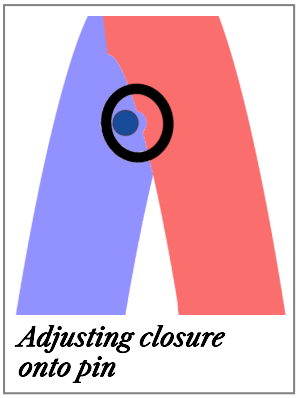
Grind Shape & Experience

The shape of the grind used is a call best made by the tool's use, based on your own experience. Additional notes are available on separate web pages for Grind Profiles (see Chapter 1), and Micro / Secondary Bevels (see Chapter 1).

Shaping the edge

New bonsai cutters should not needed to be reshaped. However, they may need work if a nick is incurred in the blade.

Handheld diamond honing tools (such as those made by DMT) or small machinist's hand files are often sufficient for reshaping the tool's cutting edge, especially as most bonsai cutting tools are made from high carbon steel. If your tools are stainless steel, a more aggressive hand file may be necessary.



Adjusting closure onto pin

Adjusting the Closure of the Cutter

If the cutter will not close completely, the tool will need to be adjusted. One of the handles has a pin which prevents the tool from being closed too harshly. The handle opposite that pin can be filed down to allow the jaws to close more tightly.

This is shown in the picture to the left. The blue handle has a pin (shown in dark blue) which stops the closure of the cutter. A notch can be filed into the pink handle so that it can close tighter over the blue handle.

To file down the handle, use a round or half-round file, and proceed slowly. Remove only a small amount of metal at a time.

Sharpening the edge

Finer grit, handheld diamond honing tools (such as those made by DMT) or small machinist's hand files are sufficient.

More Information

Videos & Presentations

- Bonsai Tools - All You Need To Know (YouTube video), by Herons Bonsai.
- How to Sharpen and Maintain your Bonsai Tools (YouTube video), by Notion Bonsai. This is a great video showing some great techniques on how to achieve the sharpened tools.

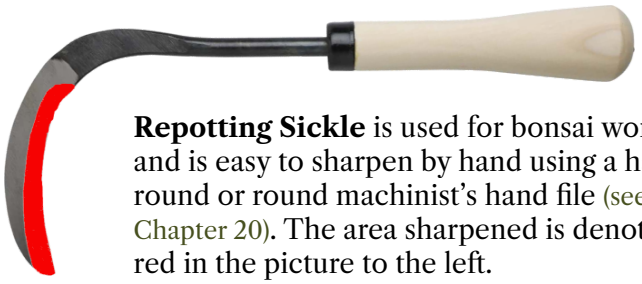
  Note: I don't agree with using hydrogen peroxide to disinfect the tools as advocated by the author of this video. Hydrogen Peroxide (H_2O_2) is also an oxidizing agent which will cause your tools to rust.
- How to Sharpen Bonsai Scissors and Branch Cutters (YouTube video), by Terry Erasmus.

Published Articles

- General Tool Maintenance (see Chapter 20)

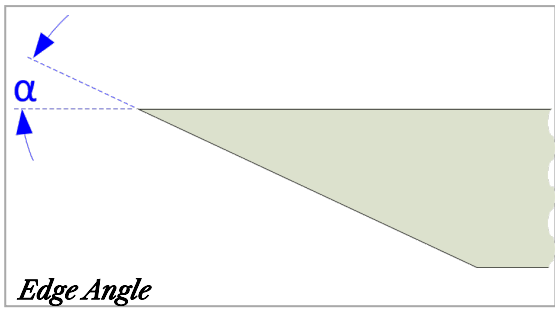
> **Sharpness Scale** - see Chapter 1.
> **Ongoing maintenance** - see Chapter 4, *Garden Tools*.
> **Grindstones and Other Sharpening Media** - see Chapter 2.

Bonsai Repotting Sickle



A

Repotting Sickle is used for bonsai work, and is easy to sharpen by hand using a half-round or round machinist's hand file (see Chapter 20). The area sharpened is denoted in red in the picture to the left.



A 6" smooth cut, half-round machinist's hand file is useful to carry in your gardening tools box. Use it to resharpen the tool as needed throughout the gardening activity.

Bonsai teaches us to look beyond what is immediately apparent.
Anonymous

General Guidelines		
Tool	α	Sharpness
Repotting Sickle	25°	5

Notes & Comments

Repotting Sickle

If sharpening this tool on the Tormek, it will have to be done by hand: the inside edge is best to sharpen on this tool. This is the part marked red in the picture above.

The edges will need to be deburred using a very fine machinist's hand file, or it can be honed using the honing wheel on the Tormek.

Note: The tool shown above to the left works well for right-handed gardeners as it is held in the right hand whilst swinging it. For Southpaws, the tool may work better if the bevel is on the opposite side.

Tormek Notes

The Tormek SG-250 grindstone works well for sharpening this tool.

If sharpening this tool on the Tormek, it will have to be done by hand.

Shaping the edge

Japanese gardening tools are typically made from high-carbon steel which is not terribly hard. When this is combined with an acute angle like 30°, it is easy to damage the edge.

Changing this tool to have a higher angle like 45° is not recommended. Instead, the gardener should use a different tool, especially where the blade could come into contact with hard objects such as gravel. These could impart significant damage to the blade of this tool.

For removing large nicks in the edge, a Tormek grinder or a 12-14" bastard file machinist's hand file will work sufficiently well. Experience has shown that either of these approaches works quite well in removing nicks from the edge after my wife or children have used the tool.

One common problem is that the pointed end of the cutting edge gets rounded over. If this happens, the back side will need to be reshaped to get the end back to a point. The side needing to be ground is shown to the right with the red arrow. The side of the tool is flat ground, keeping the edge angles as they were originally made.

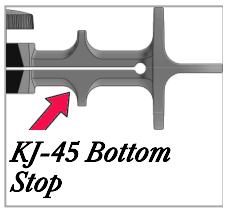
There is a Tormek video on YouTube, Tormek Live Sharpening Class - Part 15. Repair a damaged knife, which outlines such reshaping activities quite well.

This may seem an onerous task, but it only takes a few minutes, and the usefulness of the tool will be maintained.

Using a bench or angle grinder is not recommended as this will surely overheat the tool, removing the temper from the edge. Additionally, the shaping of the edge is difficult to control.

Sharpening the edge

If using a Tormek with the KJ-45 jig, the bottom stop is recommended (as indicated in the picture to the right). This makes setting the angle easier.



If you choose to use a machinist's hand file,

1. Start with a 8-10" medium (or second cut) file.
2. Finish with a 6" smooth cut file, then use this file to remove the burr.

Micro bevel Notes:

A micro bevel (see Chapter 1) could make the resharpening of this tool easier if resharpened away from the other sharpening tools. Even if the tool was sharpened in the shop using a Tormek, the gardener could use a machinist's hand file for a quick touch-up. In general though, it is not needed on this tool.

More Information

Videos & Presentations

- **Tormek's Videos**
  - Tormek Live Sharpening Class - Part 15. Repair a damaged knife (YouTube video). Wolfgang and Sèbastian from Tormek show you how you can repair damaged knife on your Tormek sharpening system If your knife has a chipped edge, a broken tip, or if it has started rusting, you can often repair the knife and make it as good as new.

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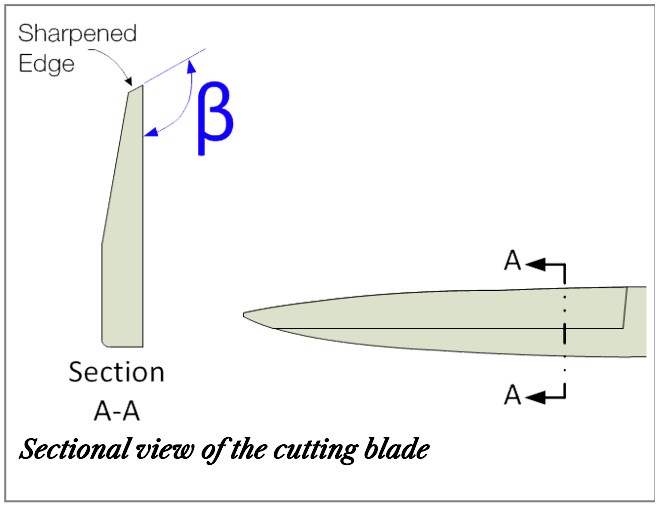
Bonsai Scissors

Guidelines shown below are for **Bevel Angles** (β).

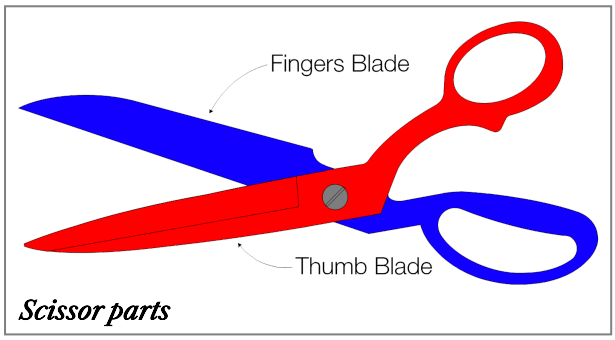
The general assumption is that this tool has the same bevels on both blades of the scissors.

Some scissors have differing angles for the **Thumb Blade** (shown in **red**) vs. the **Fingers Blade** (shown in **blue**). In those cases, separate angles are shown in the table below.

Honing Note: Honing the scissors with a very fine grindstone (4,000 grit +) is needed to ensure the scissors cut very cleanly.



Sectional view of the cutting blade



Scissor parts

Bonsai is not just about growing trees, it's about growing yourself.
John Naka

General Guidelines			
Type	β_{Thumb}	$\beta_{Fingers}$	Sharpness
Bud Scissors	120°		5
Pruning Scissors	120°		5
Trimming Scissors	120°		6

Notes & Comments

Trimming Scissors
These can be sharper to make the trimming easier.

Tormek Notes
When sharpening the scissor's blades, the Tormek SC-60 Scissors Jig or the SVX-150 Scissors Jig works well.



Tormek SC-60 Scissors Jig

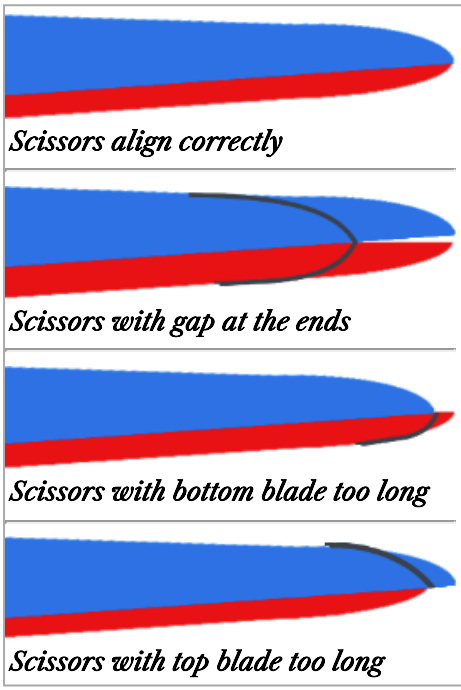
Diamond Grinding Wheels

Use of diamond wheels is not recommended unless the scissors are made from a very hard steel. The sharpness of the angle for sharpening can damage the wheel. (And the SG grindstone works quite well.)

Grindstone Rotation

When sharpening scissors, use the vertical position with the grindstone rotating towards the blade. This keeps the scissors jig properly aligned to the grindstone. (If you use the horizontal position, the grindstone will pull the scissors away from the jig.)

However, if you are sharpening left-handed scissors and they cannot be disassembled into the two pieces, you will need to sharpen from the horizontal position as the piece not being sharpened would interfere with the process otherwise (it would hit the Tormek machine).



Scissors align correctly

Scissors with gap at the ends

Scissors with bottom blade too long

Scissors with top blade too long

Tip Shortening

After sharpening, if the tips of the of the scissors do not meet, the length of one or both blades should be shortened. The most commonly seen is in the second picture where there is simply a gap at the ends where they should meet.

The black lines in the bottom 3 pictures to the left outline (in a very exaggerated manner) the shape of the blades after the ends have been shortened.

This can generally be done on the same grinding wheel as the one used to sharpen the blade. The sharpener should also check to ensure there are no sharp edges on the backs of the blades which are raised by doing this. If this happens, those should be cleaned up.

Note to the sharpener: if the scissors are very high quality, you may want to talk with the owner before making any of these adjustments.

As you do this more often, you may find that you can identify this risk before starting the sharpening process. If so, it is best to secure approval before making any changes to what may be very beloved scissors (especially if they were handed down from a loved family member).

Grind Shape & Experience

The shape of the grind used is a call best made by the tool's use, based on your own experience. Additional notes are available on separate web pages for Grind Profiles (see Chapter 1), and Micro / Secondary Bevels (see Chapter 1).

Shaping the edge

New bonsai schssors should not needed to be reshaped. However, they may need work if a nick is incurred in the blade.

The Tormek SG-250 grindstone works well for this. Alternatively, handheld diamond honing tools (such as those made by DMT) or small machinist's hand files are often sufficient for reshaping the tool's cutting edge, especially as most bonsai cutting tools are made from high carbon steel. If your tools are stainless steel, a more aggressive hand file may be necessary.

Sharpening the edge

The Tormek SG-250 grindstone, graded finely, works well for this.

Finer grit, handheld diamond honing tools (such as those made by DMT) or small machinist's hand files are sufficient.

More Information

Videos & Presentations

- Bonsai Tools - All You Need To Know (YouTube video), by Herons Bonsai.
- How to Sharpen and Maintain your Bonsai Tools (YouTube video), by Notion Bonsai.

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> **Sharpness Scale** - see Chapter 1.
> **Ongoing maintenance** - see Chapter 4, *Garden Tools*.
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