The aim of weeding and intercultivation operation is to provide best opportunity to crop to establish and grow vigorously up to time of maturity. The main objectives of weed control are to improve the soil conditions by reducing evaporation from the soil surface, improve infiltration of rain or surface water, reduce runoff to maintain ridges or beds on which the crop is grown and to reduce competition of weeds for light, nutrients and water.

Mechanical methods of weed control are simple and easily understood by farmers. The tools and implements for mechanical weed control are mostly manual and animal operated. Manual method is most effective but is slow. It is popular in regions where labour wages are low and labour is easily available during the season.

The additional cost of weeding using implements is comparatively less than the gains due to extra yields obtained. First weeding operation is mostly done between and along the rows. Remaining operations are done mostly between the rows. Hand hoes are generally used for removing weeds between plants in a row.

**Types of Weeding Tools**

The weeding tools and equipment are categorized based on their power source, e.g. manual, animal drawn and power or tractor operated.

**Manual weeding tools**

Manually operated weeder are classified as follows

**i. Small tools or aids**

Small weeding tools or aids are traditional hand held type hoes like "Khurpi" used by the farmers. These tools are operated in squatting posture and have very low work output. Different designs of these tools are being used by the farmers of different regions. These tools are suitable for removing the weeds between plants in both row-sown and broadcast fields and are quite efficient.

**ii. Spades or chopping hoes**

These weeders work on the principle of impact and have straight, curved or pronged blades. Weeds are removed by digging, cutting and uprooting. These are operated in the bending posture. The operation is normally slow and tiring.

**iii. Long handle tools/weeders**

Long handle tools have a soil working tool mounted at the end of a 1.5 to 2 metre long wooden/bamboo handle. These tools are operated in push or push-pull or pull mode and in standing posture. The soil working tool consists of one or more blades of different shape and size mounted on tines which in turn are fixed on a socket for fitting to the handle. The common shapes of blades on these weeders are straight, convex, V-shape, sweep, serrated, etc. These weeders weigh 1.5 to 2.5 kg. These are designed to work under friable soil moisture conditions and give high work output at the early stages of crop growth when weeds are small.

**Animal drawn weeding tools**

In oilseed crops, interculture and weeding operations could be done quickly and efficiently by using improved animal drawn implements. It is essential to provide wider row spacing (above 30 cm), for movement of animals and implement, if animal drawn weeders are to be used. Accurate row spacing and straight rows are a must for successful weeding. Animal drawn tools reduce the cost of operation and time.
i. Single row hoes
Animal drawn single row hoes are most widely used by the farmers of different states. Straight or slightly curved blades are commonly used in single row hoes. The size of blade can be changed as per crop row spacing.

ii. Multi-row implements
Multi-row units are widely used in Gujarat and other states for wide coverage and timely weeding operation. The three tine cultivator or “Triphali”, “Akola” hoe,”Bardoli” hoe and animal drawn sweeps of different designs are some of the new designs of animal drawn weeder.

Power operated weeding tools
Some designs of small engine operated tools have been developed for inter-row cultivation, however, the cost of operation on small farms with a power operated weeder is higher than that with push-pull type weeder. Therefore, their usefulness is limited. Tractor operated implements can be used for intercultivation but these require wider row spacing and leaving of space at the headlands for allowing the tractor to operate and turn before entering into the rows.

Requirements and Adjustment of Weeding and Intercultural Tools
As the intercultivating tools are used in cropped fields, they are to be operated with great care, lest they damage the young plants. For use in irregular or curved crop rows, one or two row cultivators are usually the best. On level, straight rowed fields, a multi-tined implement can be used. Some of the multi-tined implements have gauge wheels, which provide precise depth control while the others do not have the wheels. Expandable cultivators are versatile for adoption in row crops of different spacings. Shovels and sweeps are to be operated as shallow as possible to prevent pruning the roots of the crop plants. Sweeps are generally set flat. When the point is resting on the floor or ground, the outer tip of the wing should be elevated just 3 to 5 mm above the floor.

With increasing row crop cultivation at various row widths, it often becomes necessary to use different sizes and shapes of blades to intercultivate growing crops. The implements for intercultivation can therefore be designed with quick attaching working parts like exchangeable blades to make them versatile.

Performance of Weeding and Intercultivation Tools
The work rate for various weeding implements vary due to variation in crop growth, row and plant spacings, weed intensity, soil conditions and other factors. Typical work rates of hand hoe (Khurpi) might be varying from 300-500 man-h/ha. For hand hoeing between rows, by chopping hoe, labour requirement varies from 200-300 man-h/ha. Operation of the push-pull type weeder along the row in typical conditions requires 100-125 man-h/ha. For animal drawn weeding tools (blade hoe and blade harrow) labour requirement varies from 6-20 man-h/ha. Further if labour wage rates are high the cost of improved weeding tools can be recovered, even on a small farm, in one season due to saving in labour alone. The benefit of using improved weeding tools are, reduction in time requirement, reduction in human effort and effectiveness of operation. The time saved by use of these implements may be utilized in better care and management of crop. Thus higher yields can be obtained. The choice and selection of implements would depend on operational and economic factors. The aim should be to introduce new tools and implements to reduce drudgery and achieve timeliness of operation.
Features

The *khurpi* also known as a hand hoe is most commonly used hand tool for weeding. The tool is used in squatting position. The *khurpi* consists of a sharp, straight-edged metallic blade with a tang embedded into a wooden handle. The blade and a tang are forged in single piece to a shape from medium or high carbon steel. In some cases alloy steel (nickel, chromium or molybdenum or manganese) is also used for the fabrication of blade. The cutting edge is hardened and sharpened. The tang is joined to the wooden handle with the help of rivets. The shape and design of the *khurpi* are region or location specific depending upon the soil and cultural practices. For operation the *khurpi* is held in one hand and pushed into the soil for removal of weeds or unwanted plants. The cutting or uprooting of the weed or undesired plant takes place due to shear and impact action of the blade of the *khurpi*.

Specifications

The *khurpi* is a small and a very popular hand tool and is available in various shapes and sizes. Most of the design specifications fall in the following ranges.

Overall length (mm) : up to 350
Length of blade with tang (mm) : 150-250
Width of the cutting edge (mm) : 65-150
Weight (kg) : 0.3-0.70

Uses

The *khurpi* is used for removing weeds and unwanted plants from the crop. The tool is also used for breaking the surface layer, aeration and mulching of the soil.

Sources (Appendix)

29, 76, 92, 117, 249, 304, 309, 390, 391, 410, 463, 468, 500, 634, 780, 785, 861, 914, 955, 961, 973, 1008, 1017, 1126, 1136, 1143, 1295, 1366, 1385, 1395, 1410, 1456, 1516, 1606, 1667, 1668, 1692, 1741, 1766, 1768

KHURPI

Local Name : Khonti

Features

The *khurpi* consists of blade, one end is flattened by forging that serves as cutting edge and the other end is made as tang for fitting the handle. A piece of mild steel tube is placed on the tang end of the handle to provide a grip between tang and wooden handle. The blade of the tool is made from mild steel flat or angle section by forging.

Specifications

Raw materials used

| Blade | Mild steel angle/ flat |
**PUSH TYPE KHURPI**

*Local Name: Khonti*

**Features**
The hand tool is fabricated from mild steel rod or square bar and the working end of blade is made flattened by forging operation. Local artisans and blacksmiths fabricate the tool. The *khurpi* is used in and around Barpeta district of Assam. A wooden handle is provided for the operation of the tool. The tool is operated in squatting position by pushing the blade in the soil.

**Specification**

<table>
<thead>
<tr>
<th>Raw materials used</th>
<th>Mild steel rod or square bar</th>
<th>Wood</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Blade dimension</th>
<th>250-350×100-120×1-3</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Handle dimension</th>
<th>170-180</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Angle between the blade and handle (degrees)</th>
<th>180</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Dimension of handle</th>
<th>30-35</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Diameter (mm)</th>
<th>180-200</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Weight (kg)</th>
<th>0.20-0.25</th>
</tr>
</thead>
</table>

**Uses**
It is used for weeding operation.

**Sources (Appendix)**
100, 121, 136, 261, 950, 986

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**PUSH AND PULL TYPE KHURPA**

**Features**
The hand tool consists of flattened curved blade with tang and wooden handle. A steel ring in the handle secures the tang. The blade is made from mild steel flat, angle or old leaf spring...
steel by forging. The tip area is flattened by hammering on an anvil and sharpened along periphery. Both convex and concave edges of the tool are used for cutting of weeds. The tool is operated by push-pull action in squatting position.

**Specifications**

**Raw materials used**
- Blade: Mild steel flat/angle
- Handle: Wood

**Dimensions of blade**
- Length×Width×Thickness (mm): 100-120 × 30-35 × 4-5
- Angle between blade and handle (degrees): 100-110
- Handle diameter (mm): 30-35
- Handle length (mm): 140-150
- Weight (kg): 0.15-0.20

**Uses**

It is used for weeding and interculture operations and harvesting of crops.

**Sources (Appendix)**

Various blacksmiths of Nagaland

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**SMALL KHURPI**

*Local Name: Chota Khonti*

**Features**

The tool is made single piece by forging mild steel angle or flat section. The working end is flattened and made sharp for easy penetration in the soil. The other end is tapered for tang and fitted with a wooden or bamboo handle. The tool blade is bent so that during operation there is enough clearance between the handle and ground. The tool is operated in squatting position by pushing the blade into the soil.

**Specifications**

**Raw materials used**
- Blade: Mild steel flat or angle
- Handle: Bamboo/wood

**Dimension of blade**
- Length×Width×Thickness (mm): 90-100 × 30-40 × 3-4
- Angle between the blade and handle (degrees): 180
- Handle diameter (mm): 15-20
- Handle length (mm): 70-100
- Weight (kg): 0.15-0.25

**Uses**

It is used for transplanting of vegetable seedlings, weeding and loosening of soil and harvesting of tuber crops like onion, garlic, potato etc.

**Sources (Appendix)**

100, 114, 121, 136, 261, 950, 986, 1083, 1095, 1168, 1250, 1251, 1420, 425, 1487
Features
It is similar to other khurpis used in northeastern region of the country. The tool is made in single piece, one end flattened and the other tapered to serve as tang. The tool is made from mild steel flat, angle or thick sheet and forged to shape. The tang is inserted in the wooden handle for easy operation of the tool. The cutting edge of the tool is slightly curved and made sharp for easy penetration into the soil. The tool is operated in squatting position by pushing action.

Specifications
Raw materials used

<table>
<thead>
<tr>
<th>Raw materials</th>
<th>Blade</th>
<th>Handle</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mild steel flat, angle or sheet</td>
<td>Bamboo/wood</td>
<td></td>
</tr>
</tbody>
</table>

Dimension of blade

<table>
<thead>
<tr>
<th>Dimension of blade</th>
<th>Length×Width×Thickness (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>150-170×70-80×3-4</td>
<td></td>
</tr>
</tbody>
</table>

Handle diameter (mm)

- 25-30

Handle length (mm)

- 200-250

Weight (kg)

- 0.15-0.25

Uses
The tool is used for weeding, interculture, transplanting of seedlings and loosening of soil.

Sources (Appendix)
553, 789, 800, 803, 1069, 1622, 1625

PUSH TYPE KHURPA

Features
The hand tool consists of blade with tang and handle. The shape of the working part of the blade is made similar to sickle and both inner and outer edges are sharpened. The outer edge is used to remove the weeds by pushing action and the inner edge is used similar to sickle for cutting of weeds with thick stems. The tool is made from mild steel flat section by forging. A wooden handle is provided for easy operation of the tool. The tool is operated in squatting position.

Specifications
Raw materials used

<table>
<thead>
<tr>
<th>Raw materials</th>
<th>Blade</th>
<th>Handle</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mild steel flat</td>
<td>Bamboo/wood</td>
<td></td>
</tr>
</tbody>
</table>

Dimension of blade

<table>
<thead>
<tr>
<th>Dimension of blade</th>
<th>Length×Width×Thickness (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>180-200×90-100×1-2</td>
<td></td>
</tr>
</tbody>
</table>

Handle diameter (mm)

- 25-30

Handle length (mm)

- 100-120

Weight (kg)

- 0.10-0.13
Uses
Used for weeding and loosening of soil

Sources (Appendix)
Various blacksmiths of Arunachal Pradesh

KHURPA

Features
The tool is made from mild steel flat section or thick sheet. The working part of the blade is flattened by forging operation and the other end is made as tang, which is inserted in the wooden handle. The cutting edge is made sharp for easy penetration in the soil. The tool is operated in squatting position by pushing the blade in the soil.

Specifications
Raw materials used

<table>
<thead>
<tr>
<th>Raw materials used</th>
<th>Blade</th>
<th>Handle</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mild steel flat/ sheet</td>
<td>Wood</td>
<td></td>
</tr>
</tbody>
</table>

Dimension of blade

<table>
<thead>
<tr>
<th>Dimension of blade</th>
<th>Length×Width×Thickness (mm)</th>
<th>Handle diameter (mm)</th>
<th>Handle length (mm)</th>
<th>Weight (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>120-150×80-90×2-3</td>
<td>20-25</td>
<td>120-150</td>
<td>0.15-0.17</td>
<td></td>
</tr>
</tbody>
</table>

Uses
It is used for weeding and loosening of soil, transplanting of seedlings, and for harvesting of tuber crops

Sources (Appendix)
Various blacksmiths of Arunachal Pradesh

KHURPA

Local Name: Chenkawn

Features
The hand tool is made in single piece; one end is flattened by forging operation to the desired shape and the other end tapered to serve as tang for insertion in the wooden handle. The cutting edge of the blade is sharpened and the shape of the blade permits it to use for weeding, cutting of bushes and splitting of wood. The blade is made from mild steel or old leaf spring steel. The blade of spring steel is hardened and tempered to required hardness. The tool is operated by pushing action for weeding and like axe for cutting the bushes and splitting of wood.

Specifications
Raw materials used

<table>
<thead>
<tr>
<th>Raw materials used</th>
<th>Blade</th>
<th>Handle</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mild steel flat/leaf spring</td>
<td>Wood/bamboo</td>
<td></td>
</tr>
</tbody>
</table>
Dimension of blade
Length×Width×Thickness (mm)  120-150×55-60×3-4
Handle diameter (mm)        25-30
Handle Length (mm)          300-350
Weight (kg)                 0.22-0.25

**Uses**
It is used for weeding, cutting of bushes and splitting of wood.

**Sources (Appendix)**
Various blacksmiths of Mizoram state

### KHURPI

*Local name: Kurni*

**Features**
The tool is made in single piece, one end flattened and the other tapered to serve as tang. The tool is made from mild steel thick sheet and forged to shape. The tang is inserted in the wooden handle for easy operation of the tool. The cutting edge of the tool is straight and made sharp for easy penetration into the soil. The tool is operated in squatting position by pushing action.

**Specifications**

<table>
<thead>
<tr>
<th>Raw materials used</th>
<th>Blade</th>
<th>Handle</th>
</tr>
</thead>
<tbody>
<tr>
<td>MS sheet</td>
<td>Wood</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Dimension of blade</th>
<th>Length×Width×Thickness (mm)</th>
<th>150-170×80-90×2-3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Handle diameter (mm)</td>
<td>25-30</td>
<td></td>
</tr>
<tr>
<td>Handle length (mm)</td>
<td>180-200</td>
<td></td>
</tr>
<tr>
<td>Weight (kg)</td>
<td>0.20-0.30</td>
<td></td>
</tr>
</tbody>
</table>

**Uses**
Used for weeding and loosening of soil

**Sources (Appendix)**
233, 246, 341, 422, 429, 728, 779, 782, 819, 889, 951

### KHURPA

*Local Name: Neri Kachi*

**Features**
The hand tool consists of blade with tang and handle. The shape of the working part of the blade is made similar to weeding hook and both inner and outer edges are sharpened. The outer edge is used to remove the weeds by pushing action and the inner edge is used similar to sickle for cutting of weeds with thick stems. The tool is made from mild steel rod or square section by forging. A wooden handle is provided for easy
operation of the tool. The tool is operated in squatting position.

**Specifications**

Raw materials used

<table>
<thead>
<tr>
<th>Component</th>
<th>Material</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blade</td>
<td>Mild steel rod/square bar</td>
</tr>
<tr>
<td>Handle</td>
<td>Wood</td>
</tr>
</tbody>
</table>

Dimension of blade

<table>
<thead>
<tr>
<th>Measurement</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length x Width x Thickness (mm)</td>
<td>200-250 x 50-60 x 6-7</td>
</tr>
<tr>
<td>Angle between the blade and handle (degrees)</td>
<td>180</td>
</tr>
<tr>
<td>Handle Diameter (mm)</td>
<td>25-30</td>
</tr>
<tr>
<td>Handle Length (mm)</td>
<td>120-150</td>
</tr>
<tr>
<td>Weight (kg)</td>
<td>0.15-0.20</td>
</tr>
</tbody>
</table>

**Uses**

Used for weeding, interculture and loosening of soil.

**Sources (Appendix)**

52, 79, 95, 143, 154, 166, 182, 190, 226, 236, 259, 352, 357, 432, 505, 509, 510, 642, 643, 901, 981, 989, 1019, 1020, 1050, 1153, 1158, 1264, 1273, 1337, 1338, 1339, 1352, 1525, 1542, 1545, 1546, 1552, 1555, 1580, 1609, 1624, 1681, 1759

**KHURPA**

*Local Name: Khurpi*

**Features**

The hand tool is used for intercultural operations. It consists of blade and handle. The blade is made from mild steel flat, angle section or thick sheet and forged to shape. The blade is about rectangular in shape and the cutting edge is sharpened for easy penetration in the soil. The tang is inserted in the handle. A mild steel ring is provided on the tang end of the handle. The tool is operated in squatting position by pushing the blade into the soil.

**Specifications**

Raw materials used

<table>
<thead>
<tr>
<th>Component</th>
<th>Material</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blade</td>
<td>Mild steel flat, angle or sheet</td>
</tr>
<tr>
<td>Handle</td>
<td>Bamboo/wood</td>
</tr>
</tbody>
</table>

Dimension of blade

<table>
<thead>
<tr>
<th>Measurement</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length x Width x Thickness (mm)</td>
<td>90-110 x 70-80 x 2-3</td>
</tr>
<tr>
<td>Angle between the blade and handle (degrees)</td>
<td>180</td>
</tr>
<tr>
<td>Diameter of handle (mm)</td>
<td>35-40</td>
</tr>
<tr>
<td>Length of handle (mm)</td>
<td>100-120</td>
</tr>
<tr>
<td>Weight (kg)</td>
<td>0.20-0.25</td>
</tr>
</tbody>
</table>

**Uses**

The tool is used for dibbling of seed, weeding, loosening of soil around plants and harvesting of tuber crops.

**Sources (Appendix)**

52, 71, 79, 95, 143, 154, 166, 182, 190, 226, 236, 259, 352, 357, 432, 452, 505, 509, 510, 642, 643, 901, 981, 989, 1019, 1020, 1050, 1153, 1158, 1264, 1273, 1337, 1338, 1339, 1344, 1352, 1525, 1542, 1545, 1546, 1552, 1555, 1580, 1609, 1624, 1681, 1759
WEEDING HOOK

Features

The weeding hook is a twin-edged sickle-shaped hand tool used for cutting of tall weeds and for loosening of the soil. It consists of a curved blade with a tang fitted to the wooden handle. The inner curved edge has a serrations for cutting the weeds and acts like a sickle. The outer edge is plain and is flattened at the tip. The flattened tip is forged to a sharp edge for manipulation of the soil and acts like a khurpi/ hand hoe. The weeding hook is made from medium carbon steel or manganese steel, forged to shape. The cutting edges are hardened to 40-45 HRC. The weeding hook is usually used in stooping position. For cutting of the weeds the hook is used just like a serrated sickle giving simultaneously a curved and pulling motion. For uprooting of weeds and manipulation of soil the tip of outer edge of the hook is used by pushing action similar to khurpi/ hand hoe.

Specifications

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall length (mm)</td>
<td>310</td>
</tr>
<tr>
<td>Overall width (mm)</td>
<td>112</td>
</tr>
<tr>
<td>Serrated edge, arc length (mm)</td>
<td>150- 200</td>
</tr>
<tr>
<td>Plain edge, arc length (mm)</td>
<td>200-250</td>
</tr>
<tr>
<td>Width of blade (mm)</td>
<td>37</td>
</tr>
<tr>
<td>Thickness of blade (mm)</td>
<td>3</td>
</tr>
<tr>
<td>Weight (kg)</td>
<td>0.17- 0.20</td>
</tr>
</tbody>
</table>

Uses

The weeding hook is used for cutting and uprooting of weeds in nurseries and vegetable gardens, breaking of the soil crust and aeration of the soil.

Sources (Appendix)

29, 76, 92, 117, 249, 304, 309, 390, 391, 410, 463, 468, 500, 634, 780, 785, 861, 914, 955, 961, 973, 1008, 1017, 1126, 1136, 1143, 1295, 1366, 1385, 1395, 1410, 1456, 1516, 1606, 1667, 1668, 1692, 1741, 1766, 1768

U-BLADE WEEDER

Local Name: Nerini

Features

The weeder resembles the common tongue cleaner in shape. It is made in single piece by forging a mild steel rod. The middle portion is flattened and both edges are made sharp. End portions of the rod are used as the handle. The forged bar is bent in ‘U’ shape in such a manner that both the ends of the blade cross each other and are used for holding during weeding. For operation, the crossed ends are pulled apart to form ‘U’ and the middle flattened part is dragged on the soil surface that cuts the weeds. The weeder is operated in the sitting position.
**Specifications**

**Raw material used**
- Mild steel rod

**Dimension of blade**
- Length x Width x Thickness (mm): 120-150 x 12-15 x 0.25-0.50
- Weight (g): 40-60

**Uses**
- It is used for weeding operations.

**Sources (Appendix)**
- Various blacksmiths of Arunachal Pradesh

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**MANUAL WEEDER**

**Features**

The weeder resembles the common tongue cleaner in shape. It is made in single piece by forging mild steel flat or angle sections. The middle portion is flattened and both edges are made sharp. End portions of the sections are made flat and used as handle. The forged bar is bent in ‘U’ shape in such a manner that both the ends of the blade crosses each other and are used for holding during weeding. For operation, the crossed ends are pulled apart to form ‘U’ and the middle flattened part is dragged on the surface of soil and cut weeds. The weeder is operated in sitting position.

**Specifications**

**Raw material used**
- Mild steel flat/angle

**Dimension of blade**
- Length x Width x Thickness (mm): 150-180 x 40-50 x 0.5-1
- Weight (kg): 0.15-0.17

**Uses**
- It is used for weeding operations and loosening of soil.

**Sources (Appendix)**
- Various blacksmiths of Nagaland

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**PICKAXE**

**Features**

The pickaxe is a double pointed manually operated hand tool with an oval shaped eye for fitting the wooden handle. Usually one of the points of the pickaxe is chisel shaped and the other point diamond shaped. Pick axes are also available with both the points as diamond shaped. The chisel point is used for digging of normal soil and the diamond point for digging of rocky or hard soil. For operation the tool handle is held by hands, raised and the digging head is struck/pierced into the soil with impact action. The
action is similar to smith forging hammer. After the head point is pierced into the soil, a jerk is given to the head through the handle, which detaches the soil lump or loosens the soil. The digging head is made in single piece from medium carbon steel by forging process. The points are hardened to 350-450 HB.

**Spécifications**

The pick axes are available in various sizes and are classified according to weight, type of points and shape of the eye. The common sizes are:

- Weight (kg): 1, 2, 2.5, 2.7, 3, 3.2, 3.6, 4, 4.3 and 5

**Uses**

For digging of the soil, nursery bed preparation and general purpose digging.

**Sources (Appendix)**

29, 76, 92, 117, 249, 304, 309, 390, 391, 410, 463, 468, 500, 634, 780, 785, 861, 914, 955, 961, 973, 1008, 1017, 1126, 1136, 1143, 1295, 1366, 1385, 1395, 1410, 1456, 1516, 1606, 1667, 1668, 1692, 1741, 1766, 1768

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**KODALI**

**Features**

The *kodali* is a manually operated hand tool. It consists of a digging blade with an eye through which a wooden handle is inserted. The blade is flattened and sharpened at the digging end for easier penetration into the soil. The other end of the *kodali* is formed into an eye. In some designs the eye is made separately and welded to the digging blade. The digging blade is slightly curved and forms an angle of 80-85 degrees between the centre line of the handle and the blade. For operation the handle of the tool is held by the handle, raised and struck into the soil, similar to pick axe. The blade is made from medium carbon steel and forged to shape. The digging point is hardened to 350-450 HB.

**Specifications**

The digging hoes are available in different sizes and weights.

- Overall length with eye (mm): 200 and 250
- Blade length (mm): 150 and 200
- Blade width
  - Cutting edge (mm): 65
  - At eye (mm): 38
- Blade thickness (mm): 8 at the eye and gradually tapered to edge
- Weight (kg): 1 to 1.5

**Uses**

For digging, nursery bed preparation and general digging.

**Sources (Appendix)**

29, 76, 92, 117, 249, 304, 309, 390, 391, 410, 463, 468, 500, 634, 780, 785, 861, 914, 955, 961, 973, 1008, 1017, 1126, 1136, 1143, 1295, 1366, 1385, 1395, 1410, 1456, 1516, 1606, 1667, 1668, 1692, 1741, 1766, 1768
SMALL KODALI
Local Name: Tana kodal

Features
The Tana Kodal is a multi-purpose soil working hand tool. It consists of a digging blade with an eye for insertion of the handle. The blade is made of mild steel flat, angle or sheet and is forged to shape. Some artisans also use old leaf spring steel for making the tool. The tip of the tool is hardened and sharpened to a fairly sharp edge. The angle between the blade and handle is less than 90°. For operation the operator raises the handle of the tool and the tool head is struck in the soil. The edge penetrates in the soil digging a lump.

Specifications
Raw materials used
Blade: Mild steel angle and flat
Handle: Wood/bamboo

Dimensions of blade
Length × Width × Thickness (mm): 115-135×70-85×2-4
Handle diameter (mm): 20-30
Handle length (mm): 450-600
Angle between blade and handle (degrees): 40-50
Weight (kg): 0.30-0.40

Uses
Used for weeding, loosening of soil and harvesting of tuberous crops like ginger, garlic, onion etc.

Sources (Appendix)
52, 166, 226, 352, 432, 452, 503, 642, 643, 989, 1056, 1061, 169, 1265, 1271, 339, 1555, 1609

MATTOCK

Features
The mattock is a multipurpose double-ended hand tool. The one end has a broad edged blade for digging and the other end consists of narrow edged blade similar to axe for cutting the roots and small stumps. Both these blades are joined together with an eye to which a wooden handle is fixed. Both the ends are operated by holding the handle, raising and striking into the soil or in the roots/ stumps. The mattock is fabricated from medium carbon steel and forged to shape. The cutting edges are hardened to 37-45 HRC.

Specifications
The mattocks are available in various sizes and their typical specifications are-
Blade length (mm): 180 each
Blade width (mm): 100, broad end
TRENCHING HOE

Features
The trenching hoe is a double-ended manually operated hand tool. One end of the trenching hoe head consists of flat and rectangular shaped piece similar to powrah and the other end is of chisel shaped blade similar to pick axe or kodali. Both the ends are joined to an eye to which wooden handle is attached. The trenching hoe is thus a combination of powarh and picks axe or kodali and is usually used for lighter operations. The working head is made from medium carbon steel and forged to shape. The cutting edges are sharpened for easy penetration and hardened to 340-425 HB. For operation, the tool is held by the handle, raised and struck into the soil. The operation is similar to pick axe or kodali.

Specifications
The trenching hoes are available in various sizes and usually classified according to their weight. The specifications of a typical trenching hoe are:
- Length of flat end (mm) : 152
- Width of flat end (mm) : 152
- Overall length (mm) : 330
- Weight (kg) : 0.67

Uses
For digging, making field drains for irrigation and drainage, earthing operations and breaking of clods.

Sources (Appendix)
29, 76, 92, 117, 249, 304, 309, 390, 391, 410, 463, 468, 500, 634, 780, 785, 861, 914, 955, 961, 973, 1008, 1017, 1126, 1136, 1143, 1295, 1366, 1385, 1395, 1410, 1456, 1516, 1606, 1667, 1668, 1692, 1741, 1766, 1768

MANUAL WEEDER

Local Name: Tuthlawh

Features
The hand tool consists of a triangular shape blade with one of the vertices drawn to form a tang. The blade is forged from mild steel flat section to shape. The tang is inserted in a wood handle at the curved end. The cutting edge of the blade is sharpened for easy penetration in the soil. The tang end is also used for dibbling of seeds by replacing the handle. For
operation, the tool is operated in bent posture or in squatting position by holding the handle and drawing the blade in the soil towards the operator. It can also be used by a striking action of the blade in the soil.

**Specifications**

Raw materials used
- **Blade**
  - Mild steel flat
- **Handle**
  - Bamboo

Dimension of blade
- **Length x Width x Thickness (mm)**: 200-220 x 40-45 x 2-3
- **Angle between the blade and handle (degrees)**: 90
- **Handle diameter (mm)**: 35-40
- **Handle length (mm)**: 150-180

**Uses**

Useful for weeding, dibbling and harvesting of tuber crop such as ginger, potato etc.

**Sources (Appendix)**

Various blacksmiths of Mizoram state

**POWRAH**

**Features**

The powrah is a manually operated common hand tool used for digging and in nursery bed preparation. It is known by different names in different parts of the country. It consists of a thin flat blade set transversely on a handle. The digging head has an eye for the insertion of the handle. The eye is either separately welded to the digging blade or is an integral part of the blade. The powrah is made from medium carbon steel and forged to shape. The cutting edge is hardened to 350-450 HB. These are available in different shapes and sizes. Some of the common powrahs are West India, Agriculture, East India, Bombay, Half Moon, Mysore, Swan Neck and Button Head.

For operation, the handle of the powrah is held in hand, head raised and struck in the soil for digging. For earthing operation the tool head is pulled towards the operator in bent position.

**Specifications**

Powrahs are specified by their types and weight.

- **Weight (kg)**: 1.1 to 1.8
- **Blade thickness (mm)**: 2.5 to 3.75, forged and sharpened at the cutting edge
- **Blade width (mm)**: 50 to 80 depending upon weight

**Uses**

For digging, loosening of earth, making of trenches, weeding and nursery bed preparation.
STRAIGHT EDGE POWRAH

Features
Keeping in view the size of the blade it is used as multi purpose soil working tool. The powrah is made from mild steel angle or mild steel plate and forged to shape. The tool has an eye for insertion a wooden handle and a wide cutting edge. The edge is made sharp for easier penetration in the soil. The handle is at an acute angle to the blade for better penetration in the soil during operation. It is operated by raising the handle and striking the tool head in the soil or ground.

Specifications
Raw material used
Blade : Mild steel angle/MS plate
Handle : Wood/bamboo

Dimension of blade
Length×Width×Thickness (mm) : 200-220×120-130×3-4
Angle between the blade and handle (degrees) : 75-80
Handle diameter (mm) : 40-45
Handle length (mm) : 1000-1200
Weight (kg) : 0.65-0.70

Uses
For land preparation, intercultural operation and harvesting of tuberous crops.

Sources (Appendix)
Various blacksmiths of Nagaland

LONG ROUND EDGE POWRAH

Features
It is used for different seedbed operation but more suitable for puddling operation in upland paddy fields. The blade is made of mild steel angle or mild steel plate by forging. The working edge of the tool is curved and the opening of eye is adjustable to accommodate different diameters handles. A suitable wooden or bamboo handle is fixed. The operation of the tool is similar to other soil striking hand tools. The cutting edge of the tool is sharpened for easy penetration in the soil.

Specifications
Raw material used
Blade / Body : Mild steel angle/ plate
Handle : Wood/bamboo

Dimension of blade
<table>
<thead>
<tr>
<th>Length × Width × Thickness (mm)</th>
<th>300-320 × 120-130 × 3-4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Angle between the blade and handle (°)</td>
<td>80-85</td>
</tr>
<tr>
<td>Handle diameter (mm)</td>
<td>40-45</td>
</tr>
<tr>
<td>Handle length (mm)</td>
<td>1000-1200</td>
</tr>
<tr>
<td>Weight (kg)</td>
<td>1.00-1.20</td>
</tr>
</tbody>
</table>

**Uses**
For land preparation, puddling, intercultural operation and harvesting of tuberous crops.

**Sources (Appendix)**
Various blacksmiths of Nagaland

**ROUND EDGE MEDIUM POWRAH**

**Features**
This is a local digging tool used in Nagaland. The cutting edge of the powrah is round in shape and sharpened. The blade is made from mild steel angle or plate by forging. An eye is a part of the tool for insertion of the handle. The powrah is used by raising the handle of the tool by both hands and tool head is struck in the soil. It is available in different sizes.

**Specifications**

<table>
<thead>
<tr>
<th>Raw material used</th>
<th>Mild steel angle/ plate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blade</td>
<td>Wood/bamboo</td>
</tr>
<tr>
<td>Handle</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Dimension of blade</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length × Width × Thickness (mm)</td>
</tr>
<tr>
<td>Angle between the blade and handle (degrees)</td>
</tr>
<tr>
<td>Handle diameter (mm)</td>
</tr>
<tr>
<td>Handle length (mm)</td>
</tr>
<tr>
<td>Weight (kg)</td>
</tr>
</tbody>
</table>

**Uses**
For land preparation, puddling, intercultural operation and harvesting of tuberous crops.

**Sources (Appendix)**
Various blacksmiths of Nagaland

**KHASI POWRAH**

**Features**
The triangular shaped powrah is very popular in khasi region of Meghalaya. It is made from mild steel angle iron section or flat by forging operation. The tang and blade are made in single unit and an eye is joined to the tang for fitting of the handle. It is used mainly by the male workers for different agricultural operations like ploughing, puddling, bund making and other intercultural operations. The tool is operated by imparting impact motion or by pulling in the loose soil by dragging the tool head towards
LADIES POWRAH

Features
This is a triangular shape powrah used in Meghalaya. It is made from mild steel angle iron or flat section by forging operation. Due to small size mainly ladies and children operate it for different agricultural and gardening operations. It is used for operations like weeding, intercultural and harvesting of tuber crops.

Specifications
Raw materials used
Blade : Mild steel angle iron or flat section
Handle : Wood or bamboo

Dimensions of blade
Length × Width × Thickness (mm) : 420-450 × 300-350 × 4-5
Handle diameter (mm) : 35-50mm
Handle length (mm) : 800-900mm
Angle between blade and handle (degrees) : 45 degrees
Weight (kg) : 1.25-2.0kg

Uses
Primary tillage operations and Intercultural operations

Sources (Appendix)

LADIES POWRAH

Features
This is a triangular shape powrah used in Meghalaya. It is made from mild steel angle iron or flat section by forging operation. Due to small size mainly ladies and children operate it for different agricultural and gardening operations. It is used for operations like weeding, intercultural and harvesting of tuber crops.

Specifications
Raw materials used
Blade : Mild steel angle iron or flat section
Handle : Wood or bamboo

Dimensions of blade
Length × Width × Thickness (mm) : 300-350 × 200-250 × 2-3
Handle diameter (mm) : 30-40
Handle length (mm) : 500-650
Angle between blade and handle (degrees) : 45
Weight (kg) : 0.75-0.95

Uses
Digging, loosening of soil, weeding and harvesting of tuber crops.

Sources (Appendix)

130
POWRAH

Features
This powrah is made from mild steel sheet by forging operations. The surface of the blade is trapezoidal in shape and slightly curved. The tang is used to join eye with the blade. The cutting edge is thin and sharp. The tool is used by striking it in the soil or by pulling the tool head towards the operator. It is provided with a suitable wooden or bamboo handle.

Specifications
Raw materials used
- Blade: Mild steel sheet
- Handle: Wood/bamboo

Dimensions of blade
- Length x Width x Thickness (mm): 200-250 x 150-200 x 2-3
- Handle diameter (mm): 25-30
- Handle length (mm): 1000-1200
- Angle between blade and handle (degrees): 25-35 (approx)
- Weight (kg): 0.90-1.10 (without handle)

Uses
It is used for tillage operations, cleaning of channels, weeding, harvesting of tuberous crops, etc.

Sources (Appendix)

SMALL POWRAH

Features
It is a small size powrah like tool made from old leaf spring steel, mild steel flat or angle section by forging operations. A thin and sharp cutting edge is made for easy penetration in the soil. The cutting edge of powrah is made of hardened spring steel and tempered for long service life. A suitable wooden or bamboo handle is provided in the tool.

Specifications
Raw materials used
- Blade: Leaf spring/mild steel flat or angle
- Handle: Wood/bamboo

Dimensions of blade
- Length x Width x Thickness (mm): 150-200 x 80-100 x 2-3
- Handle diameter (mm): 25-30
- Handle length (mm): 400-500
- Angle between blade and handle (degrees): 85 (approx)
- Weight (kg): 0.25-0.30 (without handle)
Uses
It is used for tillage, intercultural operations, gardening and harvesting of tuber crops.

Sources (Appendix)
233, 246, 422, 447, 728, 782, 819, 889

POWRAH

Features
It is a popular hand tool used in Tripura region and resembles in shape and size to that of commercial type of powrah available in the market. The local tool is made of mild steel sheet by forging. An eye is provided for fitting the handle and is part of the blade. A slight curve is given from eye to the blade edge so that the handle makes an acute angle with the blade for easier penetration in the soil. It is operated by striking the tool head in the soil or drawing the tool towards operator.

Specifications
Raw materials used
- Blade: Mild steel sheet
- Handle: Wood/bamboo

Dimensions of blade
- Length × Width × Thickness (mm): 240-250×180-200×3-5

Dimensions of handle
- Diameter (mm): 30-45
- Length (mm): 1000-1200
- Angle between blade and handle (degrees): 30-45 (approx)
- Weight (kg): 1.25-1.50 (without handle)

Uses
Primary and secondary tillage operations; weeding, cleaning of streams and channels; forning of bunds and harvesting of tuberous crops.

Sources (Appendix)
259, 352, 510, 642, 643, 1019, 1158, 1580, 1624, 1759

POWRAH
Local Name: Bewngtu thlawh

Features
It is similar to shape and size to that of commercial type of powrah available in the market. It is made by village artisans in different sizes. The blade is made of mild steel sheet and is forged to shape. For strengthening of the blade a groove is created at the back of the blade from an eye to the middle of the blade. The eye and blade are forged in single piece. The tool is operated by striking the blade in the soil or by pulling the tool head towards the operator.
**Specifications**

Raw materials used

<table>
<thead>
<tr>
<th>Material</th>
<th>Blade</th>
<th>Handle</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mild steel sheet</td>
<td>Wood/bamboo</td>
</tr>
</tbody>
</table>

Dimensions of blade

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length × Width × Thickness (mm)</td>
<td>140-250×100-160×2-3</td>
</tr>
<tr>
<td>Handle diameter (mm)</td>
<td>35-40</td>
</tr>
<tr>
<td>Handle length (mm)</td>
<td>700-1200</td>
</tr>
<tr>
<td>Angle between blade and handle (degrees)</td>
<td>85</td>
</tr>
<tr>
<td>Weight (kg)</td>
<td>0.30-0.70</td>
</tr>
</tbody>
</table>

**Uses**

Used for preparation of soil bed, cleaning of drainage, weeding in crop fields and harvesting of tuberous crops.

**Sources (Appendix)**

Various blacksmiths of Mizoram state.

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**SPADES AND SEPRANGS**

**Features**

Spades and sprang are manually operated hand tools. These consist of digging blade, socket and wooden handle. The blade is given a small curvature along its length. A sprang is a small form of spade with short handle. The socket to which a wooden handle is attached is either formed from the part of digging blade or separately welded to the blade. In long handled spades a footrest is provided for penetration of the blade into the soil. The digging blades are rectangular or heart shaped with sharpened edges. For digging the blade is pushed into the soil, which detaches a soil mass. The spade is also used for throwing the soil to small distance by swinging action of the arms. The handle may have ‘D’ or ‘T’ grip. The blade is made from medium carbon steel and the socket from blade material or mild steel. The cutting edges are hardened to 340-425 HB.

**Specifications**

The spades are of different kinds such as garden, draining, grafting, trenching etc.

<table>
<thead>
<tr>
<th>Blade length (mm)</th>
<th>Garden spades</th>
<th>Seprang</th>
</tr>
</thead>
<tbody>
<tr>
<td>220-290</td>
<td></td>
<td>200</td>
</tr>
<tr>
<td>Blade width (mm)</td>
<td>140-190</td>
<td>90 at the cutting edge</td>
</tr>
<tr>
<td>Blade thickness (mm)</td>
<td>2-2.5</td>
<td>3</td>
</tr>
<tr>
<td>Socket length (mm)</td>
<td>190-250</td>
<td>180</td>
</tr>
<tr>
<td>Handle diameter (mm)</td>
<td>30-35</td>
<td>32</td>
</tr>
</tbody>
</table>

**Uses**

For digging and cutting of soil in nursery bed preparation, gardens, tea and coffee plantations. Moving of soil to small distances.
SHOVEL

Features

The shovel is a hand tool mainly used to move excavated soil over a short distance. The main parts of the shovel are blade, socket and handle. The blade of the shovel is fabricated from tool steel. The blade is formed to the desired shape and edges hardened to 350-450 HB. The shovels used for horticultural operations are mainly of two types; round nose (heart shaped) and square nose. Generally these shovels have ‘D’ shape top handle and are operated with both hands. For operation the blade is pushed into the loose soil to scoop, which can be thrown to a short distance by swinging action. In some cases another person pulls the shovel with a rope attached to the socket for throwing the soil to a longer distance. The blade is curved along its length and width to retain the scooped soil on it.

Specifications

<table>
<thead>
<tr>
<th></th>
<th>Round nose</th>
<th>Square nose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blade length (mm)</td>
<td>330</td>
<td>340-370</td>
</tr>
<tr>
<td>Blade width (mm)</td>
<td>275</td>
<td>255-280</td>
</tr>
<tr>
<td>Weight (kg)</td>
<td>1.6</td>
<td>1.8-2.0</td>
</tr>
<tr>
<td>Angle of the handle</td>
<td>30°</td>
<td>30°</td>
</tr>
</tbody>
</table>

Uses

For scooping of the soil, making of trenches, mixing of farmyard manure, earthing and concrete mixing.

Sources (Appendix)

29, 76, 92, 117, 249, 304, 309, 390, 391, 410, 463, 468, 500, 634, 780, 785, 861, 914, 955, 961, 973, 1008, 1017, 1126, 1136, 1143, 1295, 1366, 1385, 1395, 1410, 1456, 1516, 1606, 1667, 1668, 1692, 1741, 1766, 1768

HAND SHOVEL

Features

It is a hand tool, which consists of a scoop shaped rectangular blade attached to a short handle. The blade and ferrule are made from the mild steel and cutting edges are sharpened. It
is used by the gardeners for turning of the soil in flower
and vegetable beds. For its operation, the tool is pushed in
the loose soil and lifted.

Specifications
Blade length (mm) 156
Blade width (mm) 125
Handle length (mm) 430
Handle diameter (mm) 25

Uses
For turning of the soil in flower and vegetable beds. Filling of the soil in pots.

Sources (Appendix)
29, 76, 92, 117, 249, 304, 309, 390, 391, 410, 463, 468, 500, 634, 780, 785, 861, 914, 955,
961, 973, 1008, 1017, 1126, 1136, 1143, 1295, 1366, 1385, 1395, 1410, 1456, 1516, 1606,
1667, 1668, 1692, 1741, 1766, 1768

HAND FORK

Local Name: Proh khurniut

Features
It is a small size fork having four to five numbers of fingers. Local blacksmiths fabricate the tool by cutting and forging mild steel angle iron section. The fingers are forged to desired shape by forging and the tips are sharpened for easier penetration into the soil. The ferrule is made from the sheet iron and joined to the fork body. For operation the tool is drawn towards the operator by the handle.

Specifications
Raw materials used

Fork : Angle iron
Handle : Wood / bamboo

Dimensions of whole fork
Length × Width × Height (mm) : 150-200×100-150×90-120mm

Number of fingers : 4-5 nos.
Handle diameter (mm) : 30-40
Handle length (mm) : 900-1000
Angle between fingers and handle (degrees) : 80
Weight (without handle) (kg) : 0.30-0.40

Uses
The tool is used for intercultural operations, weeding and cleaning of field and collection of weeds and harvested crops.

Sources (Appendix)
101, 554, 793, 835, 968, 1066, 1068, 1096, 1217, 1218, 1316, 1318, 1471, 1488, 1596
HAND FORK
Local name: Yotkhot

Features
It is a multipurpose 3-prong long handled tool. It consists of prongs, bent in arc shape and ferrule to which handle is attached. The prongs are made from mild steel round bars and the tips are forged to diamond point. The shanks of the prongs are flattened to strengthen them. The ferrule is usually made of mild steel tube and handle is locked in it with fastener. For operation the tool head is drawn towards operator.

Specifications
Raw materials used
<table>
<thead>
<tr>
<th>Prongs</th>
<th>Mild steel bar or tor steel</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ferrule</td>
<td>Mild steel tube</td>
</tr>
<tr>
<td>Handle</td>
<td>Bamboo/wood</td>
</tr>
</tbody>
</table>

Dimensions of whole fork
| Length × Width (mm) | 300-330×100-120 |

Dimensions of each finger
| Length (mm) | 155-245 |
| Diameter (mm) | 6-10 |
| No. of fingers | 3 nos. |

Dimensions of handle
| Diameter (mm) | 35-40 |
| Length (mm) | 1200-1500 |
| Weight (kg) | 0.45-0.50 |

Uses
It is used for breaking soil crust, weeding, and collection of weeds.

Sources (Appendix)
792, 803, 1476, 1625, 1622

HAND FORK, STRAIGHT HANDLE
Local name: Hathe kata

Features
It is a small agricultural hand tool having three numbers of pointed fingers and a wooden handle. The prongs are made by forging operations. The tool is about 100mm long, 100 wide and about 10-15mm thick whereas the fingers are about 4-5mm thick.

Specifications
Raw material used
| Fork           | Leaf spring/MS |
| flat/MS angle  | Wood           |

Dimensions of whole fork
| Length × Width × Thickness (mm) | 100-120×100-120×10-15 |
Dimensions of each finger

<table>
<thead>
<tr>
<th>Length x Width x Thickness (mm)</th>
<th>100-120 x 10-12 x 4-5</th>
</tr>
</thead>
</table>

No. of fingers

| 3 nos |

Dimensions of handle

<table>
<thead>
<tr>
<th>Diameter (mm)</th>
<th>25-30</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length (mm)</td>
<td>150-200</td>
</tr>
</tbody>
</table>

Angle between finger and handle (degrees)

| 180 |

Weight (kg)

| 0.30-0.35 |

**Uses**

Used in intercultural operations

**Sources (Appendix)**


**HAND FORK, BENT HANDLE**

*Local name: Hathe kala*

**Features**

It is a short handled fork and consists of 3 prongs, ferrule and handle. The prongs or arms are made from old leaf spring steel or mild steel flat/angle section. These are forged to shape and the tip reduced to diamond point for easy penetration in the soil. The arms made from spring steel are hardened and tempered to suitable hardness, which increases the service life of the tool. A tang is provided for joining the arms with ferrule and handle. The tool is used in squatting position by drawing the tool handle towards the operator. For digging the tool head is struck against the soil by the handle.

**Specifications**

**Raw material used**

<table>
<thead>
<tr>
<th>Fork</th>
<th>Leaf spring/MS flat/MS angle</th>
</tr>
</thead>
<tbody>
<tr>
<td>Handle</td>
<td>Wood</td>
</tr>
</tbody>
</table>

**Dimensions of whole fork**

| Length x Width x Thickness (mm) | 120-140 x 90-100 x 10-15 |

**Dimensions of each finger**

| Length x Width x Thickness (mm) | 110-120 x 10-12 x 4-5 |

**No. of fingers**

| 3 nos |

**Dimensions of handle**

<table>
<thead>
<tr>
<th>Diameter (mm)</th>
<th>25-30</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length (mm)</td>
<td>150-200</td>
</tr>
</tbody>
</table>

**Angle between finger and handle (degrees)**

| 45 |

**Weight (kg)**

| 0.25-0.30 |
Uses

It is used for various operations like weeding, loosening of soil and harvesting of tuberous crops.

Sources (Appendix)


HAND RAKE

Features

Hand rake is a manually operated hand tool, which consists of five prongs forged and bent at the tips. The prongs and ferrule are fabricated from mild steel or spring steel. The tips are forged to the shape of a screwdriver blade. The prong rods are bent from the middle in 'U' shape and welded to the socket / ferrule to which a small handle is attached. For its operation, the tool is held in one hand and dragged on the soil surface for breaking the crust. Generally the tool is used in squatting posture for light work in flower and vegetable beds.

Specifications

<table>
<thead>
<tr>
<th>Overall length (mm)</th>
<th>30</th>
</tr>
</thead>
<tbody>
<tr>
<td>Handle length (mm)</td>
<td>10</td>
</tr>
</tbody>
</table>

Uses

The tool is used for aeration in seedbed and lawns. It is also used for collection of trash in nursery beds and scratching/stirring of top layer.

Sources (Appendix)

29, 76, 92, 117, 249, 304, 309, 390, 391, 410, 463, 468, 500, 634, 780, 785, 861, 914, 955, 961, 973, 1008, 1017, 1126, 1136, 1143, 1295, 1366, 1385, 1395, 1410, 1456, 1516, 1606, 1667, 1668, 1692, 1741, 1766, 1768

GARDEN RAKE

Features

The garden rake is a manually operated hand tool. It consists of set of bent spikes joined to a frame. The spikes are fabricated from round steel section and bent to shape. A ferrule is welded to the frame for fixing the handle. Rakes with short handles are used in squatting posture and with long handle in standing posture. The rakes are available in different widths and are operated with dragging action towards the operator. The ends are forged to make pointed

Sources (Appendix)

29, 76, 92, 117, 249, 304, 309, 390, 391, 410, 463, 468, 500, 634, 780, 785, 861, 914, 955, 961, 973, 1008, 1017, 1126, 1136, 1143, 1295, 1366, 1385, 1395, 1410, 1456, 1516, 1606, 1667, 1668, 1692, 1741, 1766, 1768
edge for easy penetration. The spikes are also formed by blanking from mild steel plate and these do not require any frame.

Specifications

<table>
<thead>
<tr>
<th>Working width (mm)</th>
<th>250, 300, 350, and 400</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of spikes</td>
<td>8-18</td>
</tr>
<tr>
<td>Length of spikes (mm)</td>
<td>50-80</td>
</tr>
<tr>
<td>Pitch of spikes (mm)</td>
<td>25-32</td>
</tr>
<tr>
<td>Thickness of spikes (mm)</td>
<td>10 (round bar) and 5 (plate)</td>
</tr>
<tr>
<td>Angle of spikes</td>
<td>45-60°</td>
</tr>
</tbody>
</table>

Uses

For levelling of beds, crushing of clods, collection of uprooted weeds and aeration of soil.

Sources (Appendix)

29, 76, 92, 117, 249, 304, 309, 390, 391, 410, 463, 468, 500, 634, 780, 785, 861, 914, 955, 961, 973, 1008, 1017, 1126, 1136, 1143, 1295, 1366, 1385, 1395, 1410, 1456, 1516, 1606, 1667, 1668, 1692, 1741, 1764, 1766, 1768

GARDEN RAKE

Local name: Napikot

Features

It is a long handled tool and consists of spikes, welded to a Z section frame made from joining two pieces of angle iron. A ferrule of mild steel tube is welded to the frame in which a wooden handle is inserted for the operation of tool. These spikes are made from mild steel rod, angle or flat section and forged to shape. The tips are made sharp for easy penetration in the soil. The rake is operated by pulling the tool head towards the operator.

Specifications

Raw materials used

<table>
<thead>
<tr>
<th>Spikes</th>
<th>Mild steel rod, angles, or flat</th>
</tr>
</thead>
<tbody>
<tr>
<td>Handle</td>
<td>Bamboo/Wood</td>
</tr>
</tbody>
</table>

Dimensions of whole fork

| Length × Width (mm) | 200-300x200-250 |

Dimensions of each spike

| Length (mm) | 150-200 |
| Diameter (mm) | 6-10   |

Number of spikes

6 nos.

Dimensions of handle

| Diameter (mm) | 35-40   |
| Length (mm)   | 1200-1500mm |

Angle between blade and handle (degrees)

90

Weight (kg)

0.70-0.80 (without handle)

Uses

It is used for levelling of beds, crushing of clods, collection of uprooted weeds and aeration of soil.