

FEASIBILITY STUDY ON DESIGN OF GRASS REMOVING MACHINE

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**This report is to be present as criteria to fulfill a part of bestowal stipulation for
Bachelor's Degree in Mechanical Engineering (Design & Innovation)**

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I admit that have read this work and in opinion of mine this work was adequate from the aspect of scope and quality significantly to be awarded Bachelor Degree of Mechanical Engineering (Design & Innovation)

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ABSTRAK

Dewasa ini, setiap insan yang hidup mempunyai citarasa yang sama dalam kehidupan mereka dengan menginginkan kehidupan mereka berlalu dengan mudah dan lancar termasuklah mereka yang berada dalam sektor pertanian. Dalam sektor pertanian, manusia mengaplikasikan teknologi untuk membantu mereka untuk mengurangkan masa dan juga untuk mendapatkan hasil yang terbaik dalam aktiviti pertanian mereka. Pada masa kini, petani menggunakan cangkul dalam kebanyakan aktiviti pertanian mereka. Kebiasaannya, cangkul digunakan untuk mencangkul rumput dan juga membuang tanaman yang tidak dikehendaki selain untuk menggemburkan tanah. Tetapi, cangkul jenis konvensional ini hanya mampu melakukan satu tugas pada sesuatu masa. Penggunaan cangkul jenis ini juga kurang menyenangkan kerana dapat mengakibatkan kecederaan seperti sakit belakang mahupun dapat mengakibatkan kecelakaan yang lain kepada pengguna. Berdasarkan pemerhatian ini, penulis melihat banyak kelemahan terhadap cangkul konvensional tersebut. Sebagai langkah mengatasinya, satu produk yang dapat melakukan banyak tugas pada sesuatu masa iaitu sebuah mesin pencangkul rumput yang mudah diselenggara dicadangkan. Mesin tersebut berkemungkinan untuk mencangkul rumput serta akar rumput tersebut dan pada masa yang sama juga dapat menggemburkan tanah. Oleh itu, penulis mencadangkan satu rekabentuk mesin pencangkul rumput yang akan memenuhi setiap kehendak di atas yang juga mesra alam dan mudah digunakan.

ABSTRACT

In this day and age, people want to make their life easier in whatever they do include in agriculture sector. In the agriculture sector, people employ technology to help them to cut down the time and also to produce desired result in their farming activities. They utilize machinery to help them to improve their way of agriculture. In the recent time, farmer use hoe in their farming activities. Probably the most common used of a hoe is to remove weeds and unwanted crops as well as to plough soil. But, this type of conventional hoe can be done only a function at one time. The hoe also is not convenient to use which may cause injuries such as back pain or incident to the users. From this observation, the author saw many weaknesses of the conventional hoe. As a result, a product which can do various jobs at the same time is the solution for this problem. The design which the author want to propose is a grass removing machine (GRM) which easily to maintain that can remove weeds as well its roots and at the same time can plough soil. Hence, the author proposed a design that will suit these specific requirements. Plus, the design that has been purposed also are environmental friendly and convenient to use.

LIST OF TABLES

NO.	TITLE	PAGE
Table 1	Examples of Agriculture machinery	7
Table 2	Measurement of common Hoe	9-10
Table 3	Gear nomenclature	25-27
Table 4	Comparison Table	34
Table 5	Morphological Chart	47-49
Table 6	Concept Sketches Analysis	53-54
Table 7	Concept Screening Matrix	57
Table 8	Concept Scoring Matrix	58
Table 9	List of Components	62
Table 10	Material of the GRM components	68
Table 11	Manufacturing method of the GRM components	74

LIST OF FIGURE

FIGURE	TITLE	PAGE
Figure 2.3(a)	Hoe	8
Figure 3.2(b)	A typical modern gasoline-powered mower	14
Figure 3.2(c)	A late 19th century reel mower	14
Figure 2.3(d)	Weed Puller	16
Figure 2.3(e)	F210 Honda tiller	17
Figure 2.3(f)	A rotary tiller for agriculture	17
Figure 2.4(a)	16T type sprocket	18
Figure 2.4(b)	Types of Sprockets	19
Figure 2.4 (c)	Gear	20
Figure 2.4(d)	Gear parts labeled	24
Figure 2.4(e)	The Basic Components of Transmission Chain	29
Figure 2.4(f)	Standard Connecting Link (top) and Tap Fit Connecting Link (bottom)	30
Figure 2.4(g)	Offset Link	30
Figure 2.4(h)	Basic Structure of Large Pitch Conveyor Chain	31
Figure 2.5(a)	Sprockets and roller chain	36
Figure 2.5(b)	Bicycle Chain	36
Figure 5.1(a)	Frame	63
Figure 5.1(b)	Blade	63
Figure 5.1(c)	Roller chain	64
Figure 5.1(d)	Hand controller	64
Figure 5.1(e)	Shaft	65
Figure 5.1(f)	Tyre	65
Figure 5.1(g)	Assembly Drawing	66

FIGURE	TITLE	PAGE
Figure 5.1(h)	Exploded Drawing	67
Figure 5.3(a)	Cutting Machine	70
Figure 5.3(b)	CNC Milling Machine	71
Figure 5.3(c)	Arc Welding Machine	72
Figure 5.3(d)	Grinding Machine	73
Figure 5.3(e)	Drilling Machine	73
Figure 6.1(a)	Slide cutting	75
Figure 6.1(b)	Grass removing angle	76
Figure 6.1(c)	Analysis of Slide-cutting	77
Figure 6.2(a)	Archimedes' Spiral	79
Figure 6.2(b)	Sine-Index Spiral	81

LIST OF ABBREVIATIONS

PSM	Projek Sarjana Muda
UTeM	Universiti Teknikal Malaysia Melaka
GRM	Grass Removing Machine
CAD	Computer Aided Design
PTO	Power Take-Off
ANSI	American National Standard Institute
ISO	International Standardization Organization
JIS	Japanese Industrial Standard
CAM	Computer Aided Manufacturing
CAE	Computer Aided Element (Analysis)
PDS	Product Design Specification

TABLE OF CONTENT

TOPIC	PAGE
ADMITTANCE	i
ACKNOWLEDGEMENT	ii
ABSTRAK	iii
ABSTRACT	iv
LIST OF TABLES	v
LIST OF FIGURES	vi-vii
LIST OF ABBREVIATIONS	viii
CHAPTER 1:INTRODUCTION	
1.1 Background	1
1.2 Problem Statement	2
1.3 Problem Solving	2
1.4 Objective of Project	2
1.5 Scopes of Project	2
1.6 Organization	3
1.7 Project Planning	4
CHAPTER 2:LITERATURE REVIEW	
Introduction	
2.1 Agricultural Mechanization	5
2.2 Agricultural Mechanization Technology	6
2.3 Overview of Related Product to be designed	8
2.3.1 Hoe	8
2.3.2 Lawn-mower	11
2.3.3 The Bourquin Weed Puller	15

TOPIC	PAGE
2.3.4 Tiller	17
2.4 Overview of Mechanism to be used	18
2.4.1 Sprockets	18
2.4.2 Gear	20
2.4.3 Gear nomenclature	24
2.4.4 Basic structure of power transmission chain	29
2.4.4.1 Functions of Chain Parts	31
2.4.4.2 Power Transmission Uses	33
2.5 Summary	36
 CHAPTER 3: METHODOLOGY	
3.1 Introduction	37
3.2 Research Method	38
3.3 Usage of Software	
3.3.1 CATIA Software	39
3.4 Procedure of Design	39
3.4.1 Collecting Information	40
3.4.2 Developing Specification	40
3.4.3 Conceptual Design	41
3.4.4 Detailed Design	41
3.5 Producing Mock-Up	42
3.6 Summary	43
 CHAPTER 4: CONCEPTUAL DESIGN	
4.1 Introduction	44
4.2 Product Design Specifications (PDS)	46
4.3 Morphological chart	47
4.4 Concept Sketch	50

TOPIC	PAGE
4.5 Concept Sketches Analysis	53
4.6 General Description	55
4.7 Choosing the Best Conceptual Sketch	56
4.7.1 Concept Screening Matrix	57
4.7.2 Concept Scoring Matrix	58
4.8 Final Conceptual Design (Concept Champion)	59
4.9 Conclusion	60

CHAPTER 5: DETAILED DESIGN

Introduction

5.1 Components Design	62
5.1.1 Part Drawing	63
5.1.1.1 Frame	63
5.1.1.2 Blade & Sprocket	63
5.1.1.3 Roller Chain	64
5.1.1.4 Hand Controller	64
5.1.1.5 Shaft	65
5.1.1.6 Tyre	65
5.1.2 Assembly Drawing	66
5.2 Material Selection	68
5.2.1 AISI 1020 Steel	68
5.2.2 AISI 1018 Steel	69
5.2.3 Standard Part Selection	69
5.3 Manufacturing Method	70
5.3.1 Cutting Process	70
5.3.2 Milling Process	71
5.3.3 Welding Process	72
5.3.4 Grinding Process	73

TOPIC	PAGE
5.3.5 Drilling Process	73
5.3.6 Summary of Manufacturing Method	74
CHAPTER 6: STUDY OF ROTARY HOE MOTION	
Introduction	
6.1 Movement of cutting edge	75
6.2 Archimedes' Spiral	79
6.2.1 Graph of slide-cutting angles for Archimedes' spiral	80
6.2.2 Sine-index Spiral	81
6.2.3 Comparison of sine-index with Archimedes'	82
CHAPTER 7: DISCUSSION & CONCLUSION	
Introduction	
7.1 Discussion	83
7.2 Conclusion	85
7.3 Recommendation for future work	85
REFERENCE	86-87
APPENDIX A	
APPENDIX B	
APPENDIX C	
APPENDIX D	

CHAPTER 1

INTRODUCTION

1.1 Background

‘Projek Sarjana Muda’ (PSM) is a compulsory for all student of UTeM in order to obtain a degree in the engineering field. From the PSM, every student will apply their subject learned from the classes into the final project. There are many applications that have to do such as theoretical, analysis, design and so on.

Nowadays, people want to make their life easier in whatever they do include in agriculture sector. In the agriculture sector, people employ technology to help them to cut down the time and also to produce desired result in their farming activities. They utilize machinery to help them to improve their way of agriculture. In the recent time, farmer use hoe in their farming activities. Probably the most common used of a hoe is to remove weeds and unwanted crops as well as to plough soil. This type of conventional hoe can be done only a function at one time. The hoe also is not convenient to use which may cause injuries such as back pain or incident to the users. From this observation, the author saw many weaknesses of the conventional hoe.

Thus, a product which can do multiple jobs at the same time is the solution for this problem. The design which the author wants to propose is a grass removing machine (GRM) which easily maintained that can remove weeds with its roots and at the same time can plough soil. As a result, the author proposed a design that will suit these specific requirements. The design that will be purposed also are environmental friendly and convenient to use.

1.2 Problem Statement

In the recent time, farmer use hoe in their farming activities. Probably the most common used of a hoe is to remove weeds and unwanted crops as well as to plough soil. This type of conventional hoe can be done only a function at one time. The hoe also is not convenient to use which may cause injuries such as back pain or incident to the users.

1.3 Problem Solving

A product which can do multiple jobs at the same time is the best solution for this problem. The design which the author wants to propose is a grass removing machine which easily maintained that can remove weeds with its roots and at the same time can plough soil. As a result, the author proposed a design that will suit these specific requirements. The design that will be purposed also are environmental friendly and convenient to use. The other important feature is the design also safety to use.

1.4 Objective of project

To design a grass removing machine that easily maintained that can plough soil and at the same time will remove the grass as well its roots.

1.5 Scopes of project

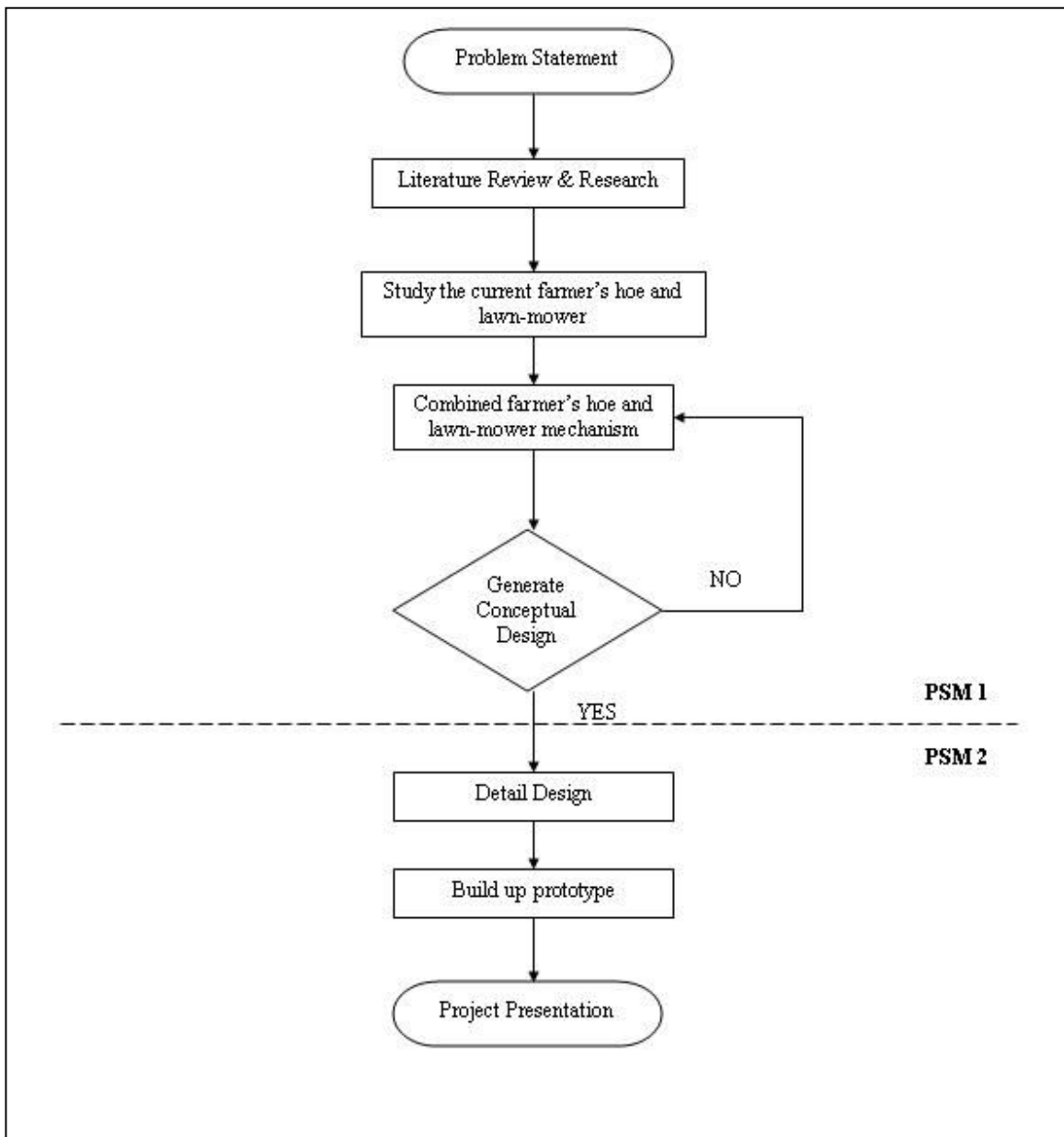
Scopes of this project are as below:

- i. To do literature review search
- ii. To generate conceptual design of the 'grass removing machine'.
- iii. To develop the detailed design of the 'grass removing machine' using CAD.
- iv. To study the motion of rotary hoe.
- v. To fabricate prototype of the design.

1.6 Organization

In chapter 1, the author covers the background, problem statement and problem solving. Then, in chapter 2, the author talks about the information which related to the project which gets through reference books, journals, as well as from internet. Followed by chapter 3, the author will cover about the methodology that will use for the project. After that, it follows by chapter 4, in this chapter the author covers the design of the project including product design specification and also conceptual design that will generate by the author. In chapter 5, detailed design of the product will be described. Then, in chapter 6, the study of the hoe's motion will be illustrated based on authors revise. In chapter 7, the author will explain about the discussion and the conclusion of the project.

1.7 Project Planning



CHAPTER 2

LITERATURE REVIEW

Introduction

The author of the project then seeks for information that may relate to the project. The information and data were got through sources such as websites, journals and reference books. By gathering all these information, it automatically will improve the author understanding on the related information of the project.

2.1 Agricultural Mechanization

Tools, implements and powered machinery, are essential and major inputs to agriculture; it can be argued that they are one of the most important. The term “Mechanization” is generally used as an overall description of the application of these inputs. There are three sources of farm power utilized for these tools, machines and equipment, manual (human) and animal draft, and motorized power. In many developing countries up to 80% of farm power is provided by human beings. In most developed countries human beings are used less and less as a source of power and more for machine operation and control.

The level, appropriate choice and subsequent proper use of mechanized inputs into agriculture has a direct and significant effect on achievable levels of land productivity, labour productivity, the profitability of farming, the environment and, last but not least, on the quality of life of people engaged in agriculture. In most cases, in a situation where the expansion of agricultural land is limited, the application of advanced tools and machines

does not, by itself, lead to increased unit yields. However, the full benefit achieved through the use of many advanced crop husbandry inputs such as improved seed, fertilizer, and pesticides, as well as increased use of irrigation water cannot be realized without the use of improved tools and machines. Only under certain conditions, where production increases achieved through the use of other improved inputs has come to its limits, can improved tools and equipment by themselves lead to production increases, cost reductions or improvements in the environmental sustainability of farming. In situations where land is not a constraint, increased farm power can lead to direct increases in production by simply increasing the land area or animal numbers that one man can handle.

In the past, misunderstood concepts and inappropriate selection and use of certain mechanization inputs (mainly tractors and heavy machinery) have, in many parts of the world, led to heavy financial losses and lowered agricultural production as well as contributed to environmental degradation. [1]

2.2 Agricultural mechanization technology

Agricultural engineers design agricultural machinery, equipment, and agricultural structures. Agricultural engineers may perform tasks as planning, supervising and managing the building of dairy effluent schemes, irrigation, drainage, flood and water control systems, perform environmental impact assessments and interpret research results and implement relevant practices. Agricultural mechanization technology can be simply be described as using agriculture machinery which improve productivity of agriculture nowadays. Among of the machineries that used in agriculture are as stated in Table 1.







<p style="text-align: center;">ROTARY MOVER</p> <p>It chops every type of grass herbs or different pasture plants in high speed. Because the discs are very close to the ground it augments the productivity. It chops the herbs in such a way that it dries easily and is collected easily.</p>	
<p style="text-align: center;">MULTI PURPOSE,PNEUMATIC SENSITIVE SOWING MACHINE SUITABLE FOR EVERY KIND OF SEEDS</p> <p>It takes its moving from back shaft of the tractor. It is tied to the tractor by means of three points hanging system. You can sow seed of like sunflowers, beetroot sugar, millet, melon and soybean in any conditions. Using the machine is easy, robust and its adjusting is facilitated.</p>	
<p style="text-align: center;">BORORED HOEING MACHINE</p> <p>The borored hoeing machine is used in hoeing the sides of sunflowers, maize, Soya beans, cotton, beet, tomato beans, melons etc. plants in a row. Hoeing the soil refreshes the soil protects it from splitting and makes to mix the fertilizer to the soil and eases the water to pass in it. It protects your field from weeds, it delays the drought and makes you to save from watering down the field and labour for it. It heightens up the productivity of the product.</p>	
<p style="text-align: center;">PLOUGH</p> <p>Easy to mount to all type of tractors with 3 point hitch. Simple and sturdy structure from durable steel. Extendable from 2- to 3 furrow or from 3- to 4- furrow. Shear pins protect the beams and base important if the plough is used in soil with boulders or roots.</p>	
<p style="text-align: center;">CHIESEL</p> <p>It makes the rain water go deeper into the soil very deep and refreshes it too this ploughing heightens up the productivity of the soil an again. The chisel will serve you for a very long time as it is made of strong and resisting material. Does not tire the tractor saves from petrol consumption and time.</p>	
<p style="text-align: center;">CULTIVATOR</p> <p>These products are produced in two different models, with and without pipe, and with 7 - 9 - 11 and 13 tines. You can use our cultivator for the secondary dressing of soil, preparing seed bed, loosening the soil, breaking the lumps, cutting root crops, improving the water distribution and preventing the soil from making sole. Cultivator keeps the moisture of soil for it does not process the soil by overturning and it hoes and airs by adjusting the changeable tines distances.</p>	

Table 1: Examples of Agriculture machinery

(Picked from [http://www.mpg.com.tr/ENG/MACHINERY PRODUCTION GROUP COMPANY AGRICULTURAL MACHINES.htm](http://www.mpg.com.tr/ENG/MACHINERY_PRODUCTION_GROUP_COMPANY_AGRICULTURAL_MACHINES.htm))

2.3 An Overview of related product to be designed.

For this step, the author himself gathered related information about similar product to be designed. The aspect of the products which to be considered is its functions. Functions that the author emphasizes in collecting associated information either must be can plough the soil or must be can removed the grass as well its root.

2.3.1 An outline of Hoe

The hoe is a hand tool used in gardening. A hoe is made up of a sharp blade, usually made of metal such as iron, steel or aluminium, attached to a long handle, usually of wood. A hoe can be made up of many types of blades, with a variety of uses, probably the most common of which is the removal of weeds and unwanted crops. Along with the spade and fork, the hoe is considered a basic, essential hand-farming implement. [2]

A common hoe can be illustrated as in figure 2.3(a).

Hoes are used to:

1. Agitate the surface of the soil around plants,
2. Remove weeds and pile soil around the base of plants (hilling).
3. Create narrow furrows (drills) and shallow trenches for planting seeds and bulbs.
4. Generally dig and move soil such as in harvesting potatoes.
5. Chop weeds, roots and crop residues.

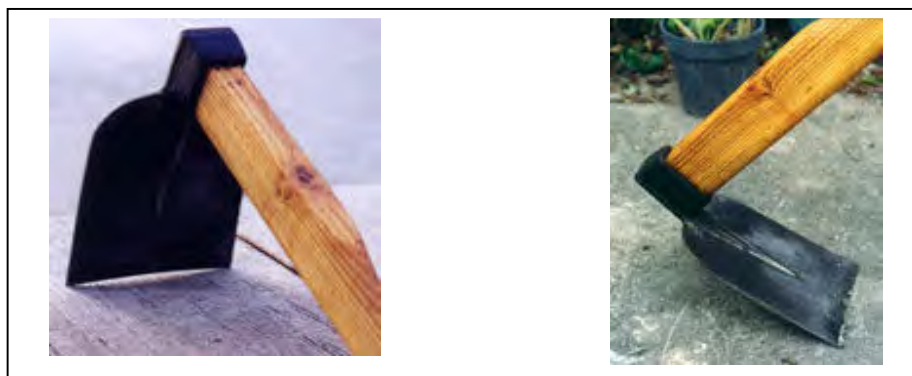





Figure 2.3(a): Hoe

(Picked from [http://en.wikipedia.org/wiki/Hoe_\(tool\)](http://en.wikipedia.org/wiki/Hoe_(tool)))

The type and measurement of the common hoe can be illustrated in table 2.

Type	Description	Weight (lb)	Head Size (mm)
	Hoe, bright and black or blue painted	2 3 3.5 4	235x140 245x155 255x165 270x170
	Hoe, bright and black or blue painted	1# 2.00lbs 2# 2.20lbs 3# 2.50lbs 4# 2.75lbs 5# 3.00lbs	- 224x166 234x180 240x190 255x198
	Hoe, bright and black or blue painted	2 2.5 3	210x155 220x160 272x178


	Hoe, bright and black or blue painted	2-3/4	250x172
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Table 2: Measurement of common Hoe

(Source from <http://www.farm-tool.com/hoe-and-scoop/hoe-and-scoop.asp>)

*Ordinary, hoes are 41 inches (104.14cm) long.

Type of Hoe

There are many types of blade of quite different appearance and purpose. Some can perform multiple functions. Others are intended for a specific use. For the example the collinear hoe has a narrow and razor-sharp blade which is used to slice weeds by skimming it just above the surface of the soil with a sweeping motion but it is unsuitable for tasks like soil moving and chopping.

How to use a hoe

Garden hoes are essentially poles to which a blade has been appended, at a 90-degree angle. The poles (handles) are about 4.5 feet long. Garden hoes are an old-time favorite in the war against weeds. A garden hoe is wielded with a swinging motion. Grip the handle at the end furthest from the blade with one hand. With the other hand, grip the handle somewhere around the middle. Use the garden hoe to slice into the soil around weeds. Raise the garden hoe up, so that the blade is out away from your body (either to your left or right side) and approximately at shoulder-height. Then swing the blade down towards the ground and slightly back towards your body, striking the ground at approximately a 45-degree angle.