



SELECTION OF MACHINERY

WHY?

Replacing manual machines or traditional methods when labour is not available for economic consideration

Large area is under cultivation

Timeliness of operation

If cost of operation of traditional method is more than improved method by machine

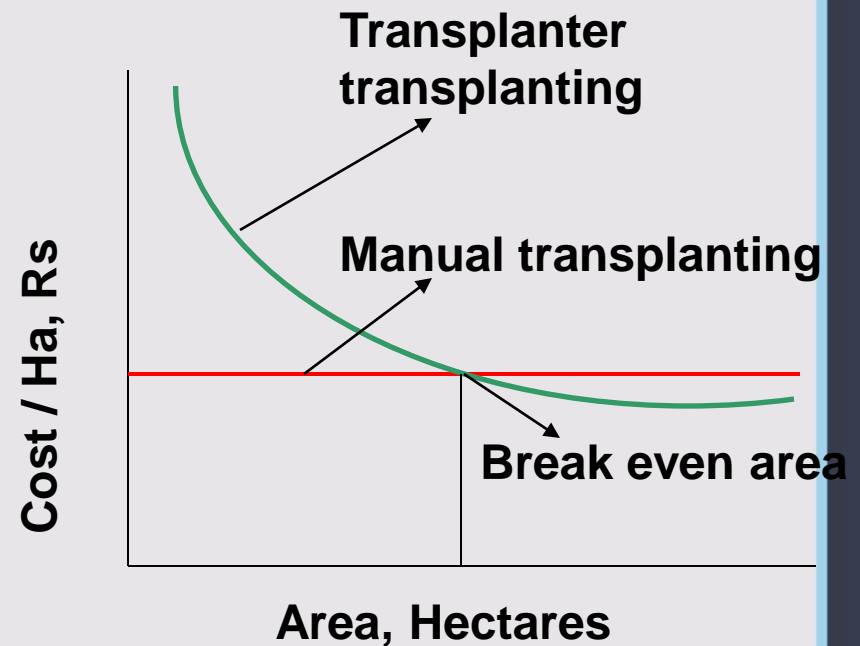
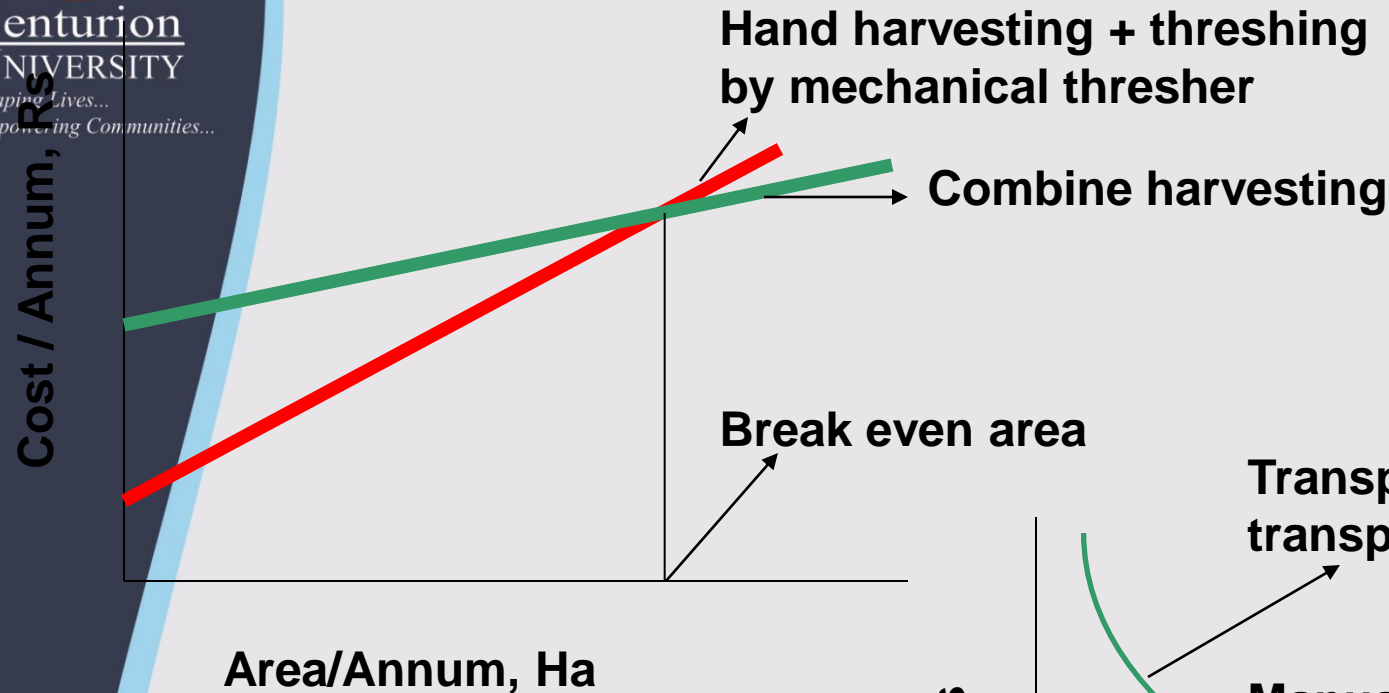
Owning a machine or custom hiring?

Break even analysis

Break even analysis



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TOTAL FIXED COST/ANNUM

MANNUAL COST/HA- VARIABLE COST/HA



Advantages of custom hiring

If machines are available for operation, then custom hiring is economical for small and medium farms

Timeliness of operation is important

For large farms partial ownership and partial hiring may be economical



Machinery selection

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For selection of machinery we need

Field capacity

Field efficiency

Timeliness cost

Annual Cost of Operation



COST OF OPERATION

Fixed cost

Depreciation [$D = (P - S)/L$]

Interest

Insurance, tax and shelter (3.5 % of the purchase price/ annum)

Variable cost

Labour cost

Fuel, oil and lubricant

Repair and maintenance cost



Determination of fixed cost percentage

Annual Depreciation

$$\text{AD} = (P - S)/L = (P - 0.1P)/L = P * 0.9/L$$

Interest

$$\text{INT} = i (P + S)/2 = i (P + 0.1P)/2 = i * 0.55 * P$$

Taxes, insurance and shelter

$$3.5\% \text{ of the purchase price} = 0.035P$$

$$\begin{aligned} \text{Total Fixed cost (TFC)} &= P * 0.9/L + i * 0.55P + 0.035P \\ &= P (0.9/L + i * 0.55 + 0.035) \end{aligned}$$

$$\text{Fixed cost \% of purchase price} = (TFC/P) * 100$$

$$= 100 * (0.9/L + i * 0.55 + 0.035)$$



Life & Repair and maintenance cost

Table 2.1. LIFE AND REPAIR COSTS OF MACHINES

Machine	Years Until Obsolete	Wear-out Life, Hours	Hours per Year for Wear-out Life to Equal Obsolescence Life*	Repair Costs, Percent of New Cost	
				Average per Hour	Total During Wear-out Life
Tractors					
Wheel-type	10	10 000	1 000	0.010	100
Track-type	15	15 000	1 000	0.007	105
Tillage implements					
Cultivator	12	2 500	208	0.048	120
Disk harrow	15	2 500	167	0.048	120
Disk plow	15	2 500	167	0.048	120
Moldboard plow	15	2 500	167	0.080	200
Spike-tooth harrow	15	2 500	167	0.040	100
Spring-tooth harrow	15	2 000	133	0.060	120
Seeders					
Grain drill	15	1 200	80	0.075	90
Row-crop planter	15	1 200	80	0.075	90
Harvesting equipment					
Bale wagon, automatic	10	2 000	200	0.040	80
Combine, self-propelled	10	2 000	200	0.025	50
Corn picker	10	2 000	200	0.038†	75
Cotton picker	10	2 000	200	0.035†	70
Cotton stripper	10	2 000	200	0.030†	60
Field chopper, pull-type	10	2 000	200	0.040	80
Hay baler, aux. eng.	10	2 000	200	0.030	60
Hay baler, PTO	10	2 000	200	0.040	80
Mower	10	2 000	200	0.150	300
Rake, side delivery	10	2 500	250	0.060	150
Sugar beet harvester	10	2 500	250	0.030	75
Windrower, self-propelled	10	2 500	250	0.040	100
Miscellaneous					
Fertilizer equipment	8	1 200	150	0.100	120
Forage blower	12	2 000	167	0.030	60
Wagon (rubber tired)	15	5 000	333	0.018	90

*When average annual use exceeds this number of hours, machine will wear out before it becomes obsolete.

†If machine is mounted type, add total of 1% of new cost for each time machine is mounted and dismounted (normally once a year).



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SELECTION OF POWER SOURCE - TRACTOR

PRIMARY CRITERIA

Size of land holding (**High hp tractor for big farm**)

Type of operation (**Field operation that is toughest**)

Working time available (80 % of the available time is utilized)

Type of soil



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Secondary criteria

Running cost

Less specific fuel consumption is preferred

SFC varies from 185 – 205 g/PTO hp/hr for 50 – 25 hp tractor

Tractor with low fuel consumption may require high R&M cost.

Major repair after 2000-3000 h of operation

Compare the fuel and R&M cost of tractors before purchase

After sale service and repair facilities

Other considerations

For puddling- see the suitability of the tractor for wet tillage

Draft and depth control system should be preferred

Safe limit of noise level (85-90 dBA)

Lower turning radius