# Performance evaluation of Turmeric Digger modified for Groundnut Digging Operation

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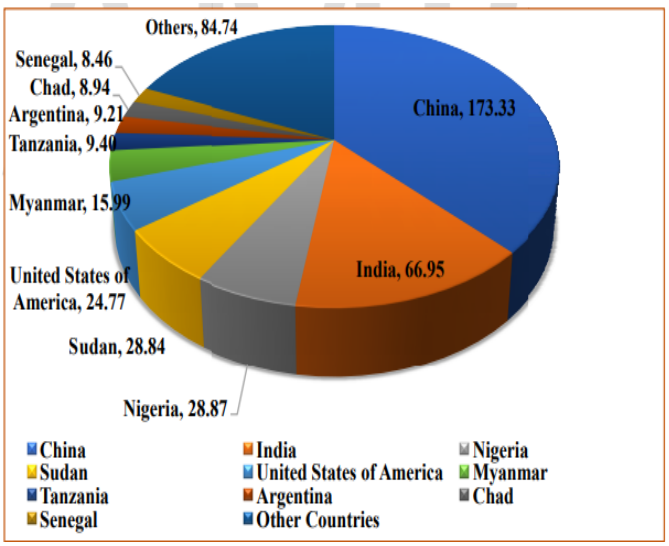
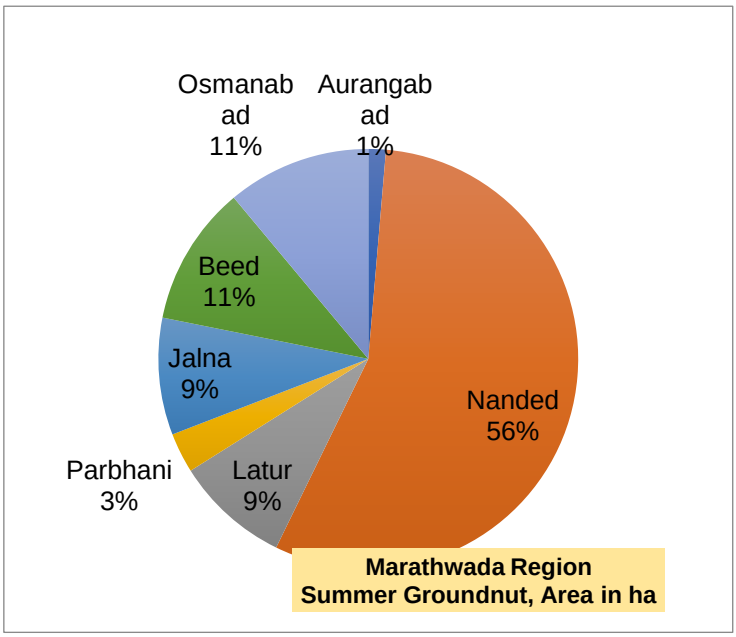
India is one among the top three groundnut producing countries of ranks second next to China. Nearly 15 percent of Groundnut production is contributed by India to the world production during 2018(1). Agriculture is the main sector in the economy of the Marathwada region of Maharashtra that is mainly dependent on monsoon rainfall. Among the oilseed crops grown in Marathwada, groundnut holds the first place. The annual production of groundnuts of Marathwada region is around 30858 tons approximately and 7 districts of Marathwada. Among the all district from Marathwada region, Nanded holds first place in groundnut production and area of cultivation both. Nanded are considered to contribute more than




16413 tons a year. In spite of the large-scale mechanization of agriculture in Maharashtra. Most of the agricultural operations are carried on by human hand using simple and conventional tools and implements like groundnut digging operation which is laborious and time-consuming operation.




**Groundnut digging with conventional method**

- The groundnut digging operation is time consuming and laborious operation leads to increase the digging cost.
- Manually about 20-30 women are required to dig and strip an acre of groundnut.
- Additionally, labors required to collect harvested crop at one place
- Manually digging operation is Drudgeries, required bending, squatting and standing posture alternately which is not ergonomically desirable.
- Groundnut Harvesting should be done on time. If you harvest before maturity lowers the yield due to shrinkage of seeds when they dried.
- Delaying in harvesting germinate the seeds in the field it self due to dormancy

- Delaying in harvesting, more pods remain in soil due to broken of roots, which reduce yield and increase labour cost form picking up the pods from the soil.
- Usually, the pods are left in the ground. The losses may be upto 10– 30 per cent depending upon the conditions.

**Plan, Implement and Support**

Keeping in view the above problems, value addition in the existing turmeric digger was done at Custom Hiring Centre, KVK Sagroli. The necessary modifications were incorporated to improve the existing turmeric digger for groundnut digging operation. The machine is converted into a tractor-driven groundnut pod digger.

**Fig.1 Making necessary modifications to the turmeric harvester machine**

**Modification**

During field testing, the existing machine for groundnut digging was found unsatisfactory performance. Because the soil volume blocking the inlet of conveyor and dug soil along with the Groundnut plants was obstructing the conveyor inlet due to low clearance between upper frame bars and existing curved iron pipes (of 10 cm length) of the conveyor. To minimize the above problem, existing iron pipes were removed. Also, during experiment, the action of the blade performance was found poor. The modifications were made to adjust the digging blade according to the requirement for the satisfactory performance of digging blade simultaneously did the Proper adjustment of multi V shape blade of the digger with maintain the blade angle between 10 to 25 Degree.

**Table.1 Performance Evaluation of the Modified Machine compared with manual method**

| Sr. No | Particular | Tractor-driven groundnut pod digger | Manual method of Groundnut digging |
|---|---|---|---|
| 1. | Digging Efficiency, % | 100 | 95 % |
| | Undug Pod Percentage | 0 | 4.5% |
| 2. | Pod Damage Percentage | 0 | 0.5% |
| 3. | Working Width, m | 1.8 | 0.3 |
| 4. | Forward speed, km/h | 2 | - |
| 5. | Field capacity, ha/h | 0.36 | - |
| 6. | Fuel Consumption, l/h | 2 | - |
| 7. | Labour requirement | - | 20 |
| 8. | Total cost required for groundnut digging | 2000 | 5000 |

**Output**

Finally, the field test was conducted at the farmer's field in sagroli Nanded for the machine evaluation. Field performance of the digger was observed and evaluated at 2km/h forward speed of tractor. The

machine performance data regarding fuel consumption, groundnut digging depth, digging efficiency, pod breakage/damage percentage etc were recorded. The experimental results showed the

**Fig. 2 Groundnut digging operation in field using the modified machine**

digging efficiency (i.e. 100%) and pod damage percentage (i.e. 0%) were observed at 2 km/h forward speed of tractor the depth. Not a single pod remains in the soil, 100% pods were harvested from the black cotton soil. The field capacity of modified digger was recorded as 0.3 ha per hour.

**Outcome**

The value-added groundnut digger was tested in black cotton soil. The machine can be used to harvest root crops other than groundnut and turmeric. The drudgery of field work will be reduced and labor shortage problem in the district will be overcome by the machine.

**Fig. 3 Conducted Demonstration at Farmer's Field**

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