Report on
Power Tiller Training for Farmer Beneficiaries and Ministry Staff at the Mangwena Irrigation Scheme (15 – 21 February 2000)

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REPORT ON
POWER TILLER TRAINING FOR FARMER BENEFICIARIES AND MINISTRY STAFF AT THE MANGWENA IRRIGATION SCHEME

1. INTRODUCTION:

The Pemba Small Scale Irrigation Project (PSSIP) is under the Irrigation Section within the Commission for Agriculture and Livestock of the Ministry of Agriculture, Livestock and Natural Resources – Pemba. The Irrigation Section in Pemba is a branch of the Zanzibar Irrigation Division, and is responsible for irrigation/water harvesting development in the whole Island of Pemba.

At the moment, PSSIP is the only donor sponsored on-going irrigation project in Zanzibar. The project duration is one year from mid-June 1999 to mid-June 2000 under the donor funding arrangements of the EU through bilateral transfer to ILO to cover technical assistance, operation and maintenance (O & M) procedures for attaining scheme sustainability. Among the objectives of the Project is to sustain and strengthen the Water Users Association (WUA) of each scheme in order to be able to manage O & M activities.

Plowing, puddling, plot levelling, transplanting and weeding are among the most laborious, time consuming and tedious field operations in rice cultivation. Women, who form the majority of the farmers in the irrigation farms, are faced with these hardships. One of the possible alternatives of alleviating such a heavy workload to women in paddy production is introduction of a power tiller which, had been kept idle in the Ministry’s workshop for almost six months due to lack of technical expertise (know-how) to operate it. At this juncture the Project recruited an experienced power tiller operator from Mtwango Irrigation Scheme in Unguja to conduct a one-week training to the farmer beneficiaries and the Ministry staff in Pemba. The training was conducted at the Mangwena irrigation scheme from February 15 – 21, 2000.

2. SELECTION OF THE TRAINING PARTICIPANTS:

The training involved five participants: three farmer beneficiaries (from Mangwena Irrigation Scheme) and two Ministry staff (from the Irrigation Section) as indicated below:

<table>
<thead>
<tr>
<th>Name</th>
<th>Designation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Khamis Abdalla Khamis</td>
<td>Farmer</td>
</tr>
<tr>
<td>2. Bakari Khatibu Faki</td>
<td>Farmer</td>
</tr>
<tr>
<td>3. Abdulla Ali Hamad</td>
<td>Farmer</td>
</tr>
<tr>
<td>4. Khamis Shaib Hamad</td>
<td>Ministry Staff</td>
</tr>
<tr>
<td>5. Thani Haji Iddi</td>
<td>Ministry Staff</td>
</tr>
</tbody>
</table>
3. **THE TRAINING CONTENT:**

The training was purely practical and covered the following:

3.1. **Check points before operation:**

The trainees were trained on procedures to be followed on checking the following points before starting the engine/operating the machine:

- Engine oil, gear oil (both in the main gearbox and rotary gearbox), engine cooling system (water in the radiator), fuel system, air pressure (of tyres), bolts and nuts, air cleaner, main clutch, the V-belt, etc.

3.2. **Procedures for operating the machine**

- **Starting engine:**
  - In starting the engine, it is important to follow the following steps:
    - Confirm that nobody is in the close vicinity and that the main clutch is in the “off” position.
    - Adjust the throttle lever at start position (half throttle).
    - Set the engine-starting handle to the starting shaft.
    - Turn the decompression lever till stop position.
    - Rotate the starting handle forcibly until buzzing sound and in a feeling of compression, simultaneously release the decompression lever and turn it strongly.
  - **NOTE:** Don’t release the starting handle until engine starts. This handle will be disengaged automatically.
  - After the engine is started, confirm that oil pressure indicator is functioning.
  - Adjust the engine revolution speed properly for warming up or idling.

3.3 **Power tiller Operation:**

- **On-road operation**
  - When the engine is warmed up, retract the stand.
  - Shift the speed change lever to a required position while the main clutch is disengaged.
  - Accelerate the engine and engage the main clutch gently. The machine moves slowly.
  - When turning, disengage the steering clutch and turn to the intended direction.
• **Stopping:**

- First reduce the engine speed and disengage the main clutch. Press the brake lever slowly until the machine comes to a full stop.
- Engage the speed change lever to a neutral position.
- Return the throttle lever to STOP position.

• **Off-road (farm operations)**

- The rotary blade works by changing the lever into HIGH and LOW position. The blade has a reverse retaining device, which inhibits the speed change mechanism from working when the main change lever is shifted to REVERSE position.

3.4 **Precautions for safety use during operation:**

The trainees were given safety precautions for safety use and efficient operation of the power tiller as follows:

- Changing gear operation should be done after the main clutch is disengaged.
- When parking the machine on a slope, the main clutch should be engaged to “OFF” position, speed lever to “NEUTRAL” position and the brake lever to “PARKING” position.
- Confirm that the main clutch is disengaged before starting engine.
- Be sure to stop engine fully before changing attachments or wheels.
- Refrain from using steering clutch while driving the machine at high speed and on slope.
- Switch off the engine during refilling. It is not advised to refuel when the engine is running.
- Be sure to stop engine and disengage the clutch of the rotary blade when changing the farm tools/implements (blades).
- Switch off the engine during servicing/cleaning of the power tiller. It is important to clean the implements (including all working parts) after farm operations.
- All covers should be located at specified positions intact.
- The machine should be parked and locked at a secured position.
- Avoid direct contact of your clothes, hands, feet, or other objects to the moving parts of the machine.
- Observe the traffic code and drive the machine carefully

3.5 **Power tiller maintenance:**

Power tiller maintenance instructions included daily servicing and periodical inspection. For longer life and high performance of the machine, it is recommended to carryout the following services:
**Daily maintenance:**
- Removal of the mud with fresh water
- Wipe-dry the machine with a clean soft cloth.
- Lubricate the machine.

**Periodical Inspection:**
Periodical inspection is necessary after every 20 hours of operation. Maintenance services will include:
- Tightening of the clamps, bolts and nuts.
- Check up of the wiring system.
- Adjustment of belts.

4. **OBSERVATIONS:**

* A rotavator can be mounted to perform plowing, harrowing and stirring the soil at a go.

* The machine is not operational and is inefficient on the boggy soils; as well as on very dry, hard (heavy) soils.

* For medium loamy soils the machine can plough up to 0.5 hectare and harrow 0.8 hectare per day; while for heavy soils is 0.3 and 0.5 hectares for ploughing and harrowing respectively.

* Fuel consumption rate is around 25 - 30 liters per hectare.

* The farmers were impressed with the working performance of the machine.

4. **CONCLUSION:**

The power tiller performance can be looked into in the following angles:

- **Elimination of the heavy workload to farmers on land preparation:**

By using a hand hoe it needs 6 man-days for ploughing and 4 man-days for harrowing 0.1 hectare. Within the same period of time a power tiller can plough around 3 hectares and harrow around 4.5 hectares. With such figures, the Mangwena scheme with 9.8 hectares could be plowed and harrowed in less than a month by using a power tiller; while it needs around 900 man-days to do the same operations manually. In this regard more time could be saved for other economic and social activities. The family heads, mainly women will have ample time to cater for their daily household chores and more time to relax.
- **Cost effectiveness:**
The costs of using the services of the power tiller are found to be fifty percent less the cost of hiring manual labour for plowing and harrowing activities for one hectare as shown below (amount in Tshs):

<table>
<thead>
<tr>
<th>Type of service</th>
<th>Manual labour charges/ha</th>
<th>Power tiller charges/ha</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plowing</td>
<td>70,000.00</td>
<td>40,000.00</td>
</tr>
<tr>
<td>Harrowing</td>
<td>60,000.00</td>
<td>25,000.00</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>130,000.00</strong></td>
<td><strong>65,000.00</strong></td>
</tr>
</tbody>
</table>

- **Quality of tilling the land:**
By using the power tiller, the depth of tilling is considerably increased. By doing so the soil aeration is increased, and offers higher root penetration into the soil. The process also helps in incorporating the rice straws into the soil thereby increasing soil organic fertility, reduces the weed competition with rice crop and eventually results in increase in outputs per unit area.

Taking into consideration of the above highlighted arguments, it is hereby concluded that use of power tiller in the irrigation fields in Pemba is economically viable, and socially acceptable. It is up to the respective authorities to implement these possibilities into reality.