EXTENSION CIRCULAR

GROUNDNUT – PIGEON PEA DOUBLE UP INTERCROPPING SYSTEM

What is double up legumes?

Double up legumes is intercropping two legumes (in this case groundnut and pigeonpea) that have different growth habits and takes advantages of beneficial interactions of the two legumes on the same piece of land. Intercropping groundnut and pigeonpea using the correct spatial arrangement increase land productivity, provides more types of food and profits while conserving and sustaining the environment through enhancement of soil fertility. Pigeonpea is suitable for intercropping with groundnut because of its slow growth in the first two months and only starts rapid growth when groundnut approaches maturity. Double up legumes leads to biomass production of between 2.3 to 3.5 t ha^{-1} compared with 1 – 2 t ha^{-1} when groundnut is grown in pure stand. The system leads to groundnut equivalent grain yield of 1.3 t ha^{-1} compared with 0.8 t ha^{-1} when groundnut is grown in pure stand. Short duration groundnut variety in intercrops with medium duration pigeonpea variety gave 520 kg ha^{-1} more grain yield than intercropping the same groundnut variety with short duration pigeonpea variety. Land equivalent ratios (LERs) of all intercrop combinations were greater than unity indicating more efficient and productive use of environmental resources by intercrops. Economic returns and benefit-cost ratios were greater for intercrops than either sole crop. This suggests that careful selection of varieties in intercrops with different architecture and growth habits are complementary and contribute to the sustainable utilization of limited land resources that enhance resource use efficiency, yield and economic returns.

What benefits can be expected from double up legumes?

Farmers intercrop groundnut and pigeon pea for the following reasons:

- ✓ To get more crops where land is limited
- ✓ Pigeon pea in Central Malawi is considered minor to occupy land on its own
- ✓ To diversify family diet and income sources

Benefits emanating from Double up legumes include:

- Improves soil fertility through biological nitrogen fixation and leaf fall from both groundnut and pigeon pea that adds soil organic matter to the soil.
- Pigeon pea roots can help break hardpans (biological plough), and tap moisture and nutrients from deep soil layers
- Leaf fall from pigeon pea forms a dense mat that smothers weeds
- Labour savings since a farmer uses labour for weeding two crops on same piece of land
- Woody stems from pigeon pea are used as fuel wood
- Increased soil biological activities thus influencing improved soil aeration, water infiltration and rate of decomposition
- Significant reduction in (witch weed) *Striga asiatica* L. suppression for the following maize grown in rotation with double up legumes
- Increased net benefit per unit kwacha invested

The recommendations in this Extension Circular are an adaptation to a technology released in Malawi through Agricultural Technology Clearing Committee (ATCC) and approved by Ministry of Agriculture, Irrigation and Water Development. For more information contact:

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Good crop management practices needed to fully realise the benefits of double up legumes

- Use of improved crop varieties recommended for a particular agro-ecology
- Timely planting
- Recommended plant spacing
- Recommended fertilizer use
- Optimum weed, pest and disease control

Varieties

Use improved varieties such as CG7 and Kakoma/Chitala groundnut varieties for mid and low altitude areas respectively. Use medium duration pigeon pea varieties such as ICEAP00557 (Mwaiwathualimi), Chitedze I and Chitedze II pigeonpea varieties for central region of Malawi.

Land Preparation and planting:

Prepare the field soon after harvest before the onset of the rains to allow early planting with the first effective rains. Make ridges that are 75 cm apart. Make a groove 5-6 cm deep on the middle of the ridge, drop a single seed of groundnut every 10 cm for Spanish varieties such as Kakoma (JL24) and Chitala and 15 cm for Virginia varieties such as CG7 and Chalimbana 2005. On the ridges already planted with groundnut, plant 2 seeds of pigeonpea (Mwaiwathualimi) per planting station at 75 cm apart but planting pigeon pea on every third row of groundnut giving one-third population of pigeon pea and full population of groundnut. One can also plant alternate rows of groundnut and pigeon pea i.e. one row of pigeon pea alternating with two rows of groundnuts. Plant spacing for both crops is as described above. Seed requirements per hectare will depend whether one uses full or two-third population of groundnut and for full population of groundnut the range is 50-60 kg per hectare for Spanish varieties and 80-100 kg per hectare for Virginia varieties depending on the seed size. Seed requirement for pigeon pea using one-third population is 3 kg per hectare.

Weeding

It is important to achieve good weed control (where necessary, apply glyphosate herbicide to any living weeds at a rate of 2.5 litres /ha at planting). This should be followed by hand weeding and making sure the field is weed free at all times

Fertilizer application

When double up legumes are grown in rotation with a crop that received NPK fertilizer the previous season, there is no need to apply any fertilizer that year

On poor soils, apply 50 kg bag of NPK (23:21:0+4S) per hectare at planting to supply that enhances root development for effective BNF.

There is no need to apply UREA as top dressing fertilizer on double up legumes

Pest management

Mwaiwathualimi is more susceptible to insect attack such as aphids, pod borers, pod suckers and thrips. Spraying against these insect pests is recorded if high yields are to be achieved. Use dimethoate to control

Harvesting and residue management

- Harvest both groundnut and pigeon pea at maturity i.e. when pods are brown for pigeon pea and when the inside of the shell turns dark for groundnut
- At maturity, there will be a dense mat of pigeon pea leaves and it is recommended never burn these residues as they add nutrients to the soil for the following cereal crop