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MANAGING WHEAT AT BOOTING STAGE

Ronnie Chigombe and Wendy Madzura

Managing wheat at booting stage

WHEAT is a temperate crop, best grown in winter conditions under irrigation with optimum day temperature of between 15 – 20 degrees Celsius and cooler nights to give best yields. In order to come up with or to achieve potential yields in wheat, farmers need to follow good agronomic practices religiously. It always starts with the right seed.

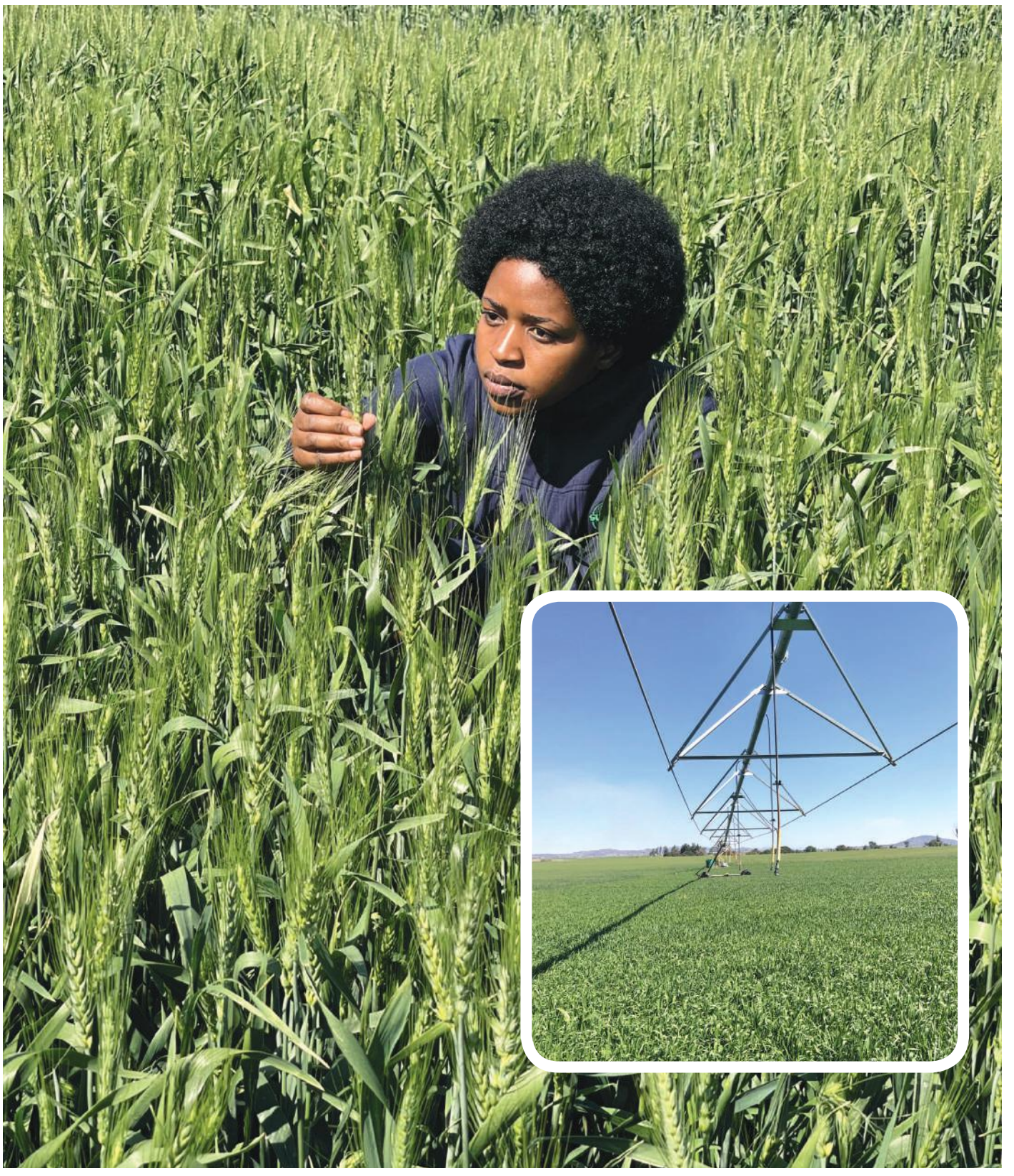
Wheat is adaptable to a wide range of soils. The soils must be well drained with an optimum pH range of 5, 5 — 6, 5 on a Calcium chloride scale.

At this point in time, assuming that our good farmers have planted in the recommended time frame with good land preparations, well-conditioned seed beds, good seeding rates etc.

The focus should be now on the management of the crop its self so that we achieve the potential yields. The following aspects must be monitored and followed:

- Irrigation Schedule
- Fertilisation
- Weed control
- Pests and disease control

At this stage the farmer should be his/her own crop doctor, who takes time to investigate the crop in order to prevent problems and improve on productivity. The farmer should diagnose problems and seek solutions, make plans, what is the most important thing to be done in each field, how and when are these going to be done.



Irrigation Schedule

Irrigation is required to achieve a high yielding crop since there will be little or no rainfall in winter. Apply 450 to 600mm per hectare by end of season using any of the irrigation methods. Irrigation should be guided by a schedule:

- Sandy soils (low water holding capacity) =7 — 9 day cycles at 30-35mm per cycle
- Clay and loamy soil (good water holding capacity) = 10-14 day cycles, 40-45mm
- Centre pivot irrigation= 22mm (5days)

Fertilisation

This should be guided by soil analysis results, soil fertility status, the yield potential and the grain quality requirements. Generally, wheat requires top dressing of 350kg/ha to 450kg/ha. It is advisable to split the application with first application at 21 days after emergence and the balance 7 — 10days later especially in sandy soils.

Top dressing is essential for good leaf and general plant growth and ultimately the yield but importantly for attaining good protein levels. Application of nitrogen after flowering can also boost the grain protein content of wheat. With the advent of centre pivots, fertigation seems to give better application and eventually increase yields, foliar fertilizers can be applied to boost crop yields.

Weeds control

Can you identify the weeds? Are they too numerous? How and when are you going to control the weeds? Did the herbicide work? If no, why not? These are the question a farmer should ask him/herself in order to deal with weeds pressure.

Farmers are advised to use specific post emergence herbicides after crop hardening. Puma super should be used to control volunteer maize plants in wheat and Ally can be used to control volunteer soya beans plants. Banvel and MCPA combination covers a wide spectrum of broadleaf weeds.

Farmers are urged to consult Agro chemical companies for information on new effective herbicides.

Pests and Diseases

Diseases such as Leaf rust, Sterm rust, Powdery mildew, fusarium head blight and Take-all may cause serious yield reduction if not controlled. Fungicides such as punch extra, Shavit, opera and folicur can be used to control. Farmers are recommended to establish certified seed with inbuilt tolerance to such diseases that include the new SC Serena and SC Select wheat seed.

Aphids and stalk borers can attack wheat with aphids coming in early soon after tillering, while borers can attack the plant from flowering onwards.

Farmers should look out for Bollworms and Fall Army Worms (FAW) given that wheat is one of the host crops to the pest. Insecticides such as karate, Nemesis, Cabaryl or Fenvalerate controls most of these pest — Consult Agro chemicals for more Insecticides.

During late grain filling stage period, quelea birds may consume much grain and reduces yields dramatically, please inform your local Agritex officer for more effective control and prevention methods.

Remember effective insect pest control is hinged on timeous identification of the problem before the economic injury or economic threshold levels have been reached, beyond this point serious yield losses may be incurred.

Chigombe is a commercial agronomist, Madzura is the Seed Co Limited head of agronomy

Why it is important to do soil sampling and testing

Lucy Kundai Zvaraya

SOIL sampling and testing are among the first steps towards attaining good yields. Farmers must do tests ahead of a new season to determine the quantities of fertiliser needed. The time of blanket fertiliser application is long gone.

In modern agriculture, soil testing is the most important practice to manage fertiliser application and crop production. Without soil testing, it is very difficult to do the right application of fertilisers for crops to score optimum yields.

What is Soil Sampling?

Soil sampling is the process of taking a small sample of soil, which is sent to the lab to determine the nutrient content. The soil can also be tested for the chemical, physical and biological properties, which are critical to plant nutrition. Basic plant nutrition requires the presence of nutrients such as nitrogen, phosphorus and potassium — soil sampling can also determine the pH levels of the soil alongside humus content, available lime, complete sulphur content and total calcium carbonate ($CaCO_3$). The analysis of the soil is carried out by taking samples of the soil and performing laboratory tests, which is then followed by an interpretation of the results. Further recommendations for fertiliser and soil preservation can then be provided.

Objectives of Soil Testing

To evaluate the fertility and nutrient status of soil for providing an index of nutrient availability or supply in a given soil.

- Determination of acidity, salinity and alkalinity problems.
- To provide a recommendation on the amount of manure and fertiliser based on soil test value and according to crop.
- To avoid excess use of fertiliser and ensure environmental safety.

When crops are harvested, a considerable amount of nutrients are removed from the soil, which causes loss of fertility in soil over a long period of time. So, the soil should be tested and evaluated for its suitability to hold the next crop.

What are the benefits of soil testing?

Soil analysis leads to more informed fertiliser decisions, reducing risks in the soil such as soil erosion, soil infertility and degraded lands and increasing farm profitability in the long-term.

- Reveals the amount of plant-available macro-nutrients in the soil and where soil nutrients are in the soil profile.
- Identifies nutrients that could be yield-limiting
- Monitors soil health properties such as pH, which affect nutrient availability to crops thereby affecting yields and profitability
- Provides a basis for variable rate application (VRT) depending upon soil and crop.
- Supports decisions about fertiliser rate, timing, placement and product.
- Improves knowledge of the soil types within the farm to maximise management options.
- Maximises in-season responsiveness.

Consequently, it also provides a farm management tool with a potential benefit to the farmer of increased yields, reduced operating costs and superior environmental risk management and it also includes improved crop maturity and quality, higher tolerance to disease and pest damage, and increased growth.

Why should farmers get their soil tested?

It informs the farmer of the current health of the farm's soil and how to improve it.

Soil fertility is determined by the soil's biological, chemical, and physical properties. Properties such as structure, soil texture, and colour are visible to the eye. However, it is hard to see the chemical composition of the soil. Therefore, there is a need for soil diagnosis and that's why soil sampling is critical. Soil tests are used to determine the soil's nutrient level and pH content. Armed with this information, farmers can define the quantity of fertiliser and the exact type that is needed for application to improve the soil on your farm. This is essential because fertile soils are necessary to grow healthy crops.

Soil test leads to minimisation

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Editor's Note

WINTER has just galloped past the home-stretch mark. Soon, it will be September and we will be in SPRING!

Naturally, there is something about spring time that brings with it a lot of promise—and energy and joy. The seeds of last harvest, dormant in the soil all winter, will patiently be waiting for the first drops of moisture that will give them the power to germinate while those fortunate to have been resting in moist spots are justifiably pushing through the earth in new growth.

New leaves will also be competing for the first opportunities to break into the world. And, as I pen this piece of writing, I cannot help but notice an army of birds flying by and singing in a cacophony of joy over the prospect of warmer weather. This is a song I can fully appreciate for it heralds the assurance of a new day to most creatures. The birth of a new natural environment.

I guess this change from season to season also means something to you as a farmer. You are there to facilitate the birth of a new agrarian reality that will give birth to a greenery that takes your attention off most of the chores that usually consume your time. Spring is now knocking on your doors and the best you can do is to make sure you respond to the stimulus it is sending now and start preparations for the 2023/24 cropping season in earnest.

Spring time is a period for you to also decide on new goals for your farm and evaluate the feasibility of trying them out. As you do this, remember that spring time reveals to you the promising signs of rebirth and renewal. It is a time that sets the tone for the re-creation of that greenery that is typical of the promising seasons that you so direly want to see in your field.

As we get into spring, it is critical for you to find some time to think and brainstorm on how you can make the 2023/24 cropping season a milestone year that you and your family will remember for years to come as that point at which you had a memorable turn-around. The long and short of what I am saying is that the planning and decisions that you will do at this point will determine the course of your entire season, so make the best of everything that you do.

Enjoy!!!!

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Potatoes in a field

Guide to growing potatoes in Zimbabwe

The cost of producing potatoes in Zimbabwe is extremely high, especially compared to other countries. Potatoes can cost between US$4,500 and US$6,500/ha to produce. These costs include equipment costs, seed, fertiliser, chemicals, irrigation, and labour.

The high production cost of growing potatoes in Zimbabwe has largely limited potato production to large-scale commercial farms. The reason being high yields are necessary for profitability at current production costs.

Emerging farmers with limited resources, experience, and knowledge have found it difficult to break into the potato farming world.

History of the Potato

Potatoes originated in the highlands of the Andes in South America. They have been consumed in that region for over 8,000 years. They were brought to Europe by Spanish explorers in the 16th century. Mass production did not begin in Europe until the 18th century.

According to the World Potato Atlas, potatoes were introduced in Zimbabwe at the turn of the century by British settlers. Commercial potato production in Zimbabwe has largely been done by large-scale commercial farmers due to the high cost and knowledge needed to produce them.

Most of the seed potato in the country is produced in the town of Nyanga where there is a quarantine station and a breeding institute. Seed potatoes are small tubers grown in areas of low virus infection. The high altitude of Manica province (1,200m above sea level) and high rainfall make it ideal for seed potato growing.

Table potatoes, on the other hand, are widely grown but concentrated around Mashonaland East and Manica province. (Regions I and II).

Growing Zones via FAO

Choose Healthy Seed Potato

The most important element of successful potato farming is using good quality seed. Buy and use only uncut, certified, disease-free "seed potatoes" (tubers).

You prevent a lot of problems later by starting off with good quality seed.

Buy your seeds from a reputable seed potato supplier such as:

Seed potato type is classified as Grade AA, Grade A or Grade XX. Tubers vary in size, colour, and texture. Seed tubers are usually about 25-55mm. It is the most expensive input for potato production, and makes up about 40% of input costs.

Preparing your seed for growing

If you buy unsprouted seed pre-sprout the potato seed in diffuse light. Pre-sprouting aids early growth. To sprout place seed potatoes, you bought in trays out of direct sunlight at 18 degrees C, then move to a cooler place when they start to sprout. When shoots are 2.5 cm long, which takes about 6weeks, they are ready to plant. Avoid excessive sprouting. You can also buy already sprouted the seed to get started.

Potato Cultivar Selection

They are several varieties of cultivars with differences in shape, colour, texture, skin texture, size, yield, and days to maturity.

Potatoes are grouped into 3 types: early, medium/main and late and uses (baking, chipping and multi-use).

The factors that affect your choice of cultivar include seed availability, yield, maturity, disease resistance, and market.

Most Common Potato Cultivars in Zimbabwe:

'Garnet' late maturity (98-120 days). Round tubers, medium size. White skin, yellow flesh. High tolerance to blight. High yield (26t/ha). Good crisping qualities for processing.

'Amethyst' prolific variety, most widely grown. Late maturity (17-19 weeks).White flesh and skin. Flat, oval and shallow eyes with rough skin. High tolerance to late blight. High yield 35-60t/ha.

'BP1' originally from South Africa. Oval, a slightly flat tuber with smooth skin and shallow eyes. Resistant to high temperatures. Medium size. Early to medium maturity. (90-110 days/ 14-15 weeks) High yield potential up to 30t/ha. Good for cooking quality, not appropriate for processing, susceptible to scab, early and late blight.

'Diamond' early to medium maturity (14-15 weeks) High yield in both Summer and Winter. White flesh and skin. Oval, smooth with shallow eyes. Moderately tolerant to late blight. Similar to BP1.

'Jasper' late maturity (17-19 weeks), vigorous. White skin and flesh. Round and oval with shallow eyes. High yield. Some tolerance to blight. Yields about 30t/ha

'Mondial' a Dutch potato with smooth skins and shallow eyes. Oval shaped, pale yellow flesh and skin. High yields. Medium to large tuber.

'Monte Clare' Late maturity (17-19 weeks), highly resistant to late blight, white skin, and flesh, oval and pear shape. High yield: 60t/ha. Susceptible to viral disease.

'Pimpernel' developed in Holland. Red skin, yellow flesh. Shallow eyes, round-large shape. Late maturity (17-19 weeks). Moderate tolerance to blight and viral disease. Not very high yield: 20t/ha. Grown under contract for processing.

Soil and Site Selection for Growing Potatoes

The best site for potatoes has full sun (6-8 hours of sun) and well-drained soils. Potatoes can be grown in most soil types but prefer loose, well-drained sandy soils with good aeration. Avoid heavy clay soils. Potatoes will rot in poorly drained soil or heavy clay soils.

The best soil pH for potatoes is between 5.0 and 6.5. It helps if the soil is fertile and moisture retentive, so apply a thick layer of compost prior to planting. A high soil pH (alkaline) is not suitable for potatoes because it can cause scab disease. Your soil test will give you your soil's pH.

Practice a three-year crop rotation

in your fields. To do this change the field which you grow your potatoes, compost and or potato family plants each year. Only plant again in that same field once every three years. It helps control and prevents insects and diseases. Potato-family members (Solanaceae) including tomatoes,

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peppers, tobacco and eggplants.

Without crop rotation, your potato losses can go up as high as 30% due to soilborne diseases. The best rotational crops for potatoes are cereals (wheat or maize) and forage grasses (Rhodes grass, Katambora).

Don't bother growing potatoes in containers such as sacks or tyres. The yields will be dismal and will not make a good return on your investment. Stick to the fields!

The potato can be grown in warm or cool climates. However, it does not withstand frost well. Frost can drastically reduce your potato yields. If frost is likely after the leaves of your early potatoes come up, cover them with floating row cover, straw, newspapers or dirt. It is better though to plant after frost danger has passed.

Potatoes also can't take a lot of heat, and tuber development is affected by high temperatures (above 30 degrees C).

The main potato growing period in Zimbabwe is in late winter (2nd winter): from late July to early August after the last frost. Planting times vary depending on your area.

Summer crops: are planted in November before the rainy season. These are more prone to disease pressure but get good germination.

1st winter: are potatoes are planted between February and April. They mature before frost begins. In the Lowveld areas, better to plant later. Plants are susceptible to late blight. Choose blight resistant varieties.

Land Preparation

Land preparation to grow potatoes is typically done using machinery to speed up the process. Plough the soil using a chisel plough or subsoiler to a depth of about 20-25cm, to a fine tilth.

You can also use a hand-held digger or a rotary tiller for working your soil before planting. It may take a little more time and energy. But can be better for your soil structure.

Do not till the soil when it is wet.

Follow through with a disc harrow to disc dead weeds. It takes many passes to get your soil to the ideal state for planting and good tuber development. Look into renting farm equipment and factor in equipment rental and fuel costs into your overall costs.

The next step is to make straight ridges using a potato ridger to set up ridges. Ridges should be between 75-90cm wide.

Amend your beds with compost and manure. Evenly mix in 25-30t/ha of well-rotter organic matter (compost or manure). Organic matter is critical for improving your soil's water holding capacity, texture, tilth and nutrients.

Sowing and Planting Potatoes

Sow sprouted tubers (potato seeds) into the ridges at a planting depth of 10-15cm right way up with eyes (or chits) facing upward. Plant deeper for dryland cultivation.

You can sow by hand or machine.

The ideal spacing for your potato seed is 20 or 30cm apart within rows (intra-row). Inter-row distance is 75 or 90 cm. Seed size and soil fertility affect row spacing.

Spacing your plants far enough apart in the rows will give them enough room to thrive. Crowding them can cause reduced fruit yield, size, and quality.

Cover over the tubers with a least 2.5 cm of soil using a rake.

It takes about 10-15 days for plants to germinate. Days to maturity range from 80 to 140 days.

As the shoots emerge and reach about 4-6 inches tall, mound the soil to cover most of the leaves. This is a process known as hilling. Hilling up (or ridging) soil around young potato plants increases yield, loosens soil and prevents weeds. It also prevents tubers from greening and getting a bitter taste.

Three weeks later, ridge (hill) again and top dress.

Plant Management

Fertilising Your Potatoes

A soil test is effective for a good fertilisation strategy. Apply fertiliser requirements based on your soil analysis results. You can get information on testing from Kutsaga or your nearest research centre.

Potatoes respond well to organic matter. Provide them with well-rotted compost or manure to amend your soil. Rake in 30t/ha of well-rotted manure evenly over the bed. Using compost and soil amendments can help you reduce your fertiliser costs.

Potatoes need plenty of nitrogen. Manure and compost are also good sources of nitrogen. Nitrogen is important for the overall development of the plant stems and leaves. Signs of nitrogen deficiency are slow growth, stunting and smaller than normal potato leaves.

Weigh out and apply a compound balanced fertiliser at the time of planting at about 170g per square metre. Dig a furrow alongside the planting row and add moisture. According to the FAO, basal fertiliser (Compound C) or (Compound S) recommendation is about 1000kg/ha. But it really depends on your soil analysis, soil type and the climate condition.

Do not overuse nitrogen, though, stick with the recommended quantities. Plants with too much nitrogen are far too lush, green and have little or no fruit.

Top dress (add fertiliser after the plants are growing) with potassium nitrate around your plants at 4, 8 and 12 weeks. Potassium improves the tuber quality (size, starch content, and storability). Do not put fertiliser on plants it can scorch foliage, put it around plants.

Add Ammonium Nitrate (AN) at 290 kg/ha three weeks after emergence.

Top dress with Sulphate of Potash split into two applications first at flowering and then two weeks after flowering.

To be continued . . .
Adapted from the internet

Why it is important to do soil sampling and testing

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of fertiliser expenditure.

Knowing the exact deficiency of soil is experiencing will result in zero wastage of such farm inputs. The quantity and type of fertilisers of crops and soil need prevent farmers from wasting money on unnecessary extra fertiliser application. Moreover, nutrients such as potassium and phosphorus that are part of inorganic fertilisers are very limited resources. Their supply is limited or rather finite; implying that there is a need to be cautious in their usage to prevent future shortages of such limited resources.

Soil testing results in limited over-fertilisation

Applying fertiliser to the soil without knowing the exact and actual nutrient that it needs will lead to over-fertilisation. Overuse of fertiliser may be harmful not only to the environment but also it might cause fertiliser burn to the crops. Testing soil prior and receiving informed fertiliser recommendation prevents farmers from applying an excessive amount of fertilisers and minimising the related environmental damages. Over-fertilisation might result in water pollution, nutrient leaching, and irreversible harm to the aquatic life. Just a simple soil test can prevent all these negative environmental effects.

Farmers can easily avoid soil degradation

It is estimated from research that each year more than 24 billion tonnes of fertile soil is lost because of erosion, which is caused by unbalanced soil management. Furthermore, land degradation directly affects the livelihoods and health of an estimated 1, 5 billion people. Soil restoration is a costly, difficult, and time-consuming process. Therefore, better soil management through soil testing is an easier route to take, and application of the right amounts of fertilisers is efficient and financially justified.

Farmers with fertile soils can contribute to feeding the world's growing population

The importance of soil testing cannot be overemphasised. Different types of soils and variation in soil properties are important factors to note in farming. Soil texture, soil moisture, and soil chemistry are determinants of what crops can be grown and how much yield the farm can produce.

The current generation puts more pressure on the soil than ever before. There is a need for fertile soils to produce yields that will feed the world's ever-growing population. Improved soil health implies more crops, potentially closing the world's food security issues. This will eventually bring a better life to millions of people. Soil testing is the first step in soil management. The activity gives farmers valuable information that helps them improve the soil's health; healthy soils eventually imply healthy crops!

Frequency of sampling

For most field cropping systems, sampling and testing the soil in each field at least once every three years is adequate. Soil pH and nutrient levels are more stable in soils with higher cation exchange capacities (CECs). In sandy soils with CECs below 6 me/100 g, the potassium, magnesium and calcium levels may change more rapidly because of crop uptake and possible leaching. In these soils, sampling more frequently is suggested. Sampling the entire farm at one time is a good practice because it provides an evaluation of the whole-farm fertility program at a given point in time. This may not always be practical, however. For large farm operations, sampling and testing one-third of the acreage each year is an alternative that provides continuity over time.

Sample uniform areas

Before sampling a field, evaluate it for differences in soil characteristics. Consider its productivity, topography, texture, drainage, color of topsoil and past management. Where these features are uniform throughout the field, each composite sample can represent up to three hectares. Because most farm fields in Zimbabwe are not uniform, samples representing more acres than this are less likely to be representative of any soil in the field. Sampling is an averaging process. The goal is to sample within a reasonably uniform area so that the composite sample is

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relatively uniform. When samples are collected from within a field with variable soil characteristics, the composite sample is quite heterogeneous. Within a variable field, areas with reasonably uniform soil characteristics need to be identified for sampling.

Soil sampling process

Points to be considered

- Collect the soil sample during fallow period.
- In the standing crop, collect samples between rows.

Sampling at several locations in a zig-zag pattern ensures homogeneity.

Soil testing and analysis

Fields, which are similar in appearance, production and past-management practices, can be grouped into a single sampling unit.

Collect separate samples from fields that differ in colour, slope, drainage, past management practices like liming, gypsum application, fertilization and cropping system.

Avoid sampling in dead furrows, wet spots, areas near main bund, trees, manure heaps and irrigation channels.

For shallow rooted crops, collect samples up to 15 cm depth. For deep rooted crops, collect samples up to 30 cm depth. For tree crops, collect profile samples.

Always collect the soil sample in presence of the farm owner who knows the farm better

Procedure

- Divide the field into different homogenous units based on the visual observation and farmer's experience.
- Remove the surface litter at the sampling spot.
- Drive the auger to a plough depth of 15 cm and draw the soil sample.
- Collect at least 15 to 20 samples from each sampling unit and place in a bucket or tray.
- If auger is not available, make a 'V' shaped cut to a depth of 15 cm in the sampling spot using spade.
- Remove thick slices of soil from top to bottom of exposed face of the 'V' shaped cut and place in a clean container.
- Mix the samples thoroughly and remove foreign materials like roots, stones, pebbles and gravels.
- Reduce the bulk to about half to one kilogramme by quartering or compartmentalisation.

Quartering is done by dividing the thoroughly mixed sample into four equal parts. The two opposite quarters are discarded and the remaining two quarters are remixed and the process repeated until the desired sample size is obtained.

Compartmentalisation is done by uniformly spreading the soil over a clean hard surface and dividing into smaller compartments by drawing lines along and across the length and breadth. From each compartment a pinch of soil is collected. This process is repeated till the desired quantity of sample is obtained.

Collect the sample in a clean cloth or polythene bag.

Label the bag with information like name of the farmer, location of the farm, survey number, previous crop grown, present crop, crop to be grown in the next season, date of collection, name of the sampler.

Collection of soil samples from a profile

After the profile has been exposed, clean one face of the pit carefully with a spade and note the succession and depth of each horizon.

Prick the surface with a knife or edge of the spade to show up structure, colour and compactness.

Collect samples starting from the bottom most horizon first by holding a large basin at the bottom limit of the horizon while the soil above is loosened by a khurpi.

Mix the sample and transfer to a polythene or cloth bag and label it.

Processing and storage

Assign the sample number and enter it in the laboratory soil sample register.

Dry the sample collected from the field in shade by spreading on a clean sheet of paper after breaking the large lumps, if present.

Spread the soil on a paper or polythene sheet on a hard surface and powder the sample by breaking the clods to its ultimate soil particle using a wooden mallet.

Sieve the soil material through 2 mm sieve.

Repeat powdering and sieving until only materials of >2 mm (no soil or clod) are left on the sieve.

Collect the material passing through the sieve and store in a clean glass or plastic container or polythene bag with proper labelling for laboratory analysis.

For the determination of organic matter, it is desirable to grind a representative sub sample and sieve it through 0.2 mm sieve.

Soil sampling summary

1. Develop a map of uniform areas within the field. Make use of soil survey maps, topography and management history.
2. Designate the sampling areas of economic importance.
3. For each composite sample, collect 20 cores to the appropriate depth using a zigzag pattern.
4. Thoroughly mix the soil cores. Partially dry very wet samples before mixing.
5. Fill a soil sample bag or box with the composite sample.
6. Fill out the information form with all the pertinent cropping management information.
7. Send the composite soil sample and information sheet to a reliable soil testing lab for analysis.

PLEASE NOTE: Different institutions may have different methods or ways they want their samples collected, this is an average guide to give farmers basic knowledge of the process. Consult your agronomist before doing the procedure.

The author is an agronomist and founder of Farm Makeover Company

Justice Chembela

Producing green mealies

AS the winter season comes to an end, farmers are pondering on which crops they should grow for the highest return per dollar invested. As a farmer, the time to turn uncertainty into opportunity is now. While others may be afraid to plant, seizing the moment and taking action gives power. This season, farmers can plant green mealies as a first step towards a profitable future. Green mealies, popularly known as chibage chekugocha, can be grown under irrigation or as rain fed.

Green Mealies will give high value on less land compared to commercial maize. There is no combine harvester, drying and grain protectant cost. The time frame is good depending on variety selection. It presents an opportunity for intensive agriculture and a mandate to produce a product of high quality. The farmer has to invest in timing, soil health, crop nutrition, crop protection, water and market.

Market expectations are the driving force behind every successful business. Understanding and meeting those expectations is essential to achieving long-term success. The market has four expectations: size, taste, softness and colour. Big, long, sweet and soft to describe the cobs harvested after milk dough stage have become the most popular attributes.

Bigger cobs are most preferred hence plant population per hectare should be reduced to achieve this. A population of 35 000 to 44 000 plants per hectare is recommended for big cobs. Seed should be planted about five centimetres deep for the best germination. Fertiliser should be placed five centimetres below the seed and covered with soil to avoid fertiliser burn.

Soil analysis is the best and produces high yields. It helps ascertain full soil nutrient requirements and the soil pH. Green mealies are grown best in a soil pH between (5, 5 – 6, 5) using the Calcium chloride scale. A pH below 5, 5 would be acidic and this will fix nutrients such as phosphorus and calcium. These nutrients become unavailable for crop uptake and cause a reduction in the yield the farmer gets per hectare. A soil pH above 5, 5 would be alkaline and this can have negative effects on maize production. It can also increase the solubility of certain minerals, such as calcium, which can lead to the formation of hard, compacted soil that can be difficult for maize roots to penetrate. This can limit nutrient uptake and overall plant health.

Crop nutrition is critical and comes in the form of basal fertilisers, top dressing and foliar fertilisers. Basal fertilisers are required at planting as they contain nitrogen, phosphorus and potassium. Phosphorus is immobile and is required close to the root zone for crop uptake. Examples include Maize Fert (7:14:7), High D (10:20:10), Double D (14:28:14 + Zinc) and Cereal Blend (6:23:23). Most Zimbabwean soils are deficient of Zinc and Double D + Zinc would promote high yields. Zinc plays a crucial role in the production of high-quality green mealies with good yield. Zinc deficiency can lead to poor kernel development, reduced size and weight of cobs, and lower sugar content, which affects the taste and nutritional value of the crop.

Top dressing options include Ammonium Nitrate, Urea and Calcium Ammonium Nitrate. Calcium Ammonium Nitrate contains Calcium Carbonate. This means that the farmer will be liming the soil while top dressing. When applying Urea, it is vulnerable to volatilisation therefore it has to be applied in moist soils or covered by soil. In sandy soils top dressing should be split applied at week 2 and at week 6. Foliar fertilisers such as Quick Start, Quick Grow and Foliar 15 are not to be used alone but are used to boost the crop as they contain trace elements such as iron, zinc and copper that are not found in the conventional fertilisers

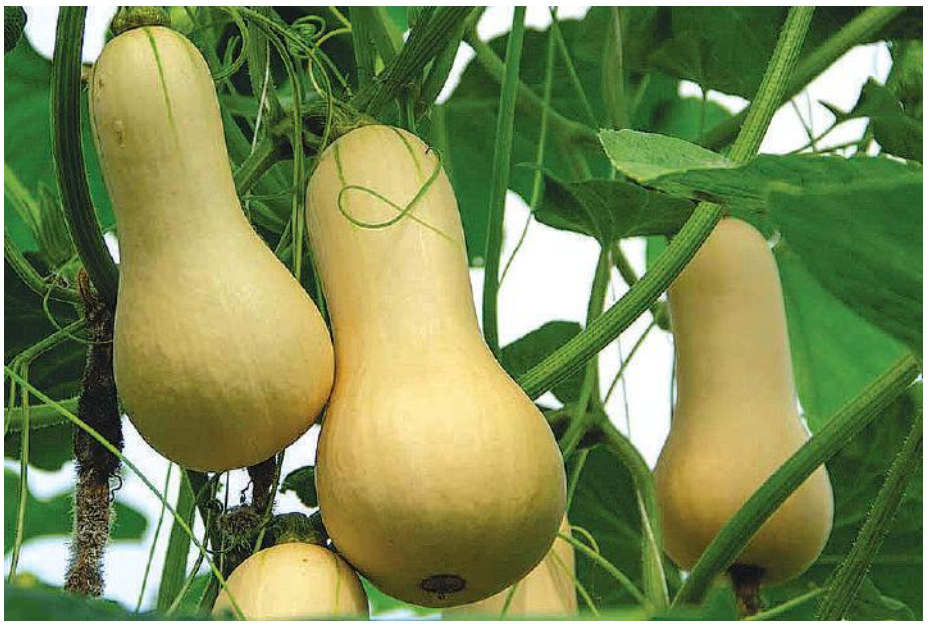
Weeds compete for sunlight space, nutrients, sunlight and water. If weeds are not controlled, they can cause a decrease in yield. Farmers can use herbicides for the control of weeds. At planting farmers can protect their yield through the use of pre plant herbicides such as Glyphosate and pre-emergence herbicides such as Ambush and Maricho. For full effectiveness of pre emergence herbicides should be applied within 48 hours of planting in the presence of moisture to create a herbicide seal. When the weeds and crops emerge the type of post emergence herbicide will depend on the weed species. For full effectiveness post emergence herbicides should be applied when weeds are still young and tender at seedling stage.

There is an increased awareness for environmental smart control measures. The farmer should adopt an integrated pest management programme. Farmers should regularly scout their crops to see if the pests have reached an Economic Threshold Level that can cause yield loss. Farmers can come in with chemical, biological, cultural and physical control measures. Chemical control measures will require the use of pesticides with different modes of action to avoid the harmful effects of resistance by pests. Green mealies production has not been the same after the introduction of the invasive pest fall armyworm since 2016 in Zimbabwe. Fall army worm can lead to complete crop failure if is not controlled as it can attack the crop during the vegetative stage, at tasselling stage and at cob formation. Chemical control includes Spike Extra, which both a contact and systemic insecticide. Moreover, it can control all stages of the life cycle of the pest.

There is a synergy that is produced when the farmer is better prepared for the season and is aware of the challenges and ways to get a better crop.

The author is an agronomist with ZFC

Crops You Can Grow in Spring/Summer



Butternut plant with fruits

ONE of the challenges you face as an emerging farmer is deciding what to grow on your farm. It's a topic we get asked about a lot.

Please don't copy what other farmers are doing without first understanding why they doing it. Even if you copy something that is working for another farmer, it doesn't necessarily mean it will work for you. They may have farming experience, soil, climate or a market that you don't have. Sometimes you end up copying a farmer who also doesn't know what they are doing.

If you are on a large commercial farm, don't copy someone growing tomatoes in bags on an urban farm, that's for people with space constraints. Yes, you can and should look and ask around for ideas from other farmers in your area (getting insights) but after that think hard and evaluate if those ideas work for you. Remember, you don't need to just pick one crop, you can also diversify and try out multiple crops until you find the ones that work best for your farm.

How to Decide What to Grow: Here is what to consider

Here are some factors to consider when deciding which crops will give you the best return on your investment (ROI):

1. Your Space/ Land

If you have a very small space, don't grow crops that take a long time to mature and harvest or take up a lot of space. Focus instead on quick growing crops (60 days or less), that do not require a lot of space. Crops like beans, lettuce, tomatoes (indeterminate type) and herbs are great for small spaces. If you have plenty of space and there is demand in your market then you should consider growing crops that require a lot of space like pumpkins or butternuts.

2. Total Yields of the Crop

Consider how much yield the crop you plan to grow produces at one time or after multiple cuttings. Does the crop consistently produce high yields? Some examples of crops that produce how yields are spinach, butternuts, and tomatoes. Crops like beans that can be planted in succession (plant now and plant again later) so you can harvest them at different times in the season. If you have a large farm you can grow more long season crops that have a high demand e.g potatoes and then make your money on the volume.

3. Time to Harvest

It's important to understand how long it takes to grow a specific crop type. If you plant late e.g maize, pick a variety of the crop with short days to maturity to avoid problems later in the season. Certain crops e.g. potatoes, onions, and garlic take a long time to grow.

If you have a large land area they are good storage crops to grow. If you don't have a lot of land or space, grow rape and lettuce instead because you can harvest them multiple times (long harvest) in the same space of time you are growing a long season crop e.g onion.

4. Market Price and Crop Price Trends

What is the price of the crop? Pay attention to price trends for the crop to see if you can grow and supply it when demand is high, but supply is low. Check the ZFU site for updates on market prices. Certain times of the year you will find a market glut in crops like tomatoes and maize and it becomes a race to the bottom. If your crops can be stored such as maize or butternut and you can afford to do it, store them well and then sell them later when prices are better.

5. Crop's Shelf Life and Storage

If the crop has a short shelf life e.g. tomatoes and rape, make sure you can sell it quickly. Are you close enough to market or have reliable transportation or storage? Can you sell to a volume buyer who can move a lot of your product for you? If not then you should focus on crops with a good shelf life that you can take your time to market.

6. Popularity of the Crop

Consider focusing on crops that people already like and eat on a regular basis. While you may sell some exotics at a high price ask yourself if you can sell enough of them to be profitable. They are just not that many people locally you are going to convince to buy and eat certain vegetables such as radishes. Let's be honest. They are just not popular.

Food is emotional and people tend to stay pretty close to what they are used to eating. As an emerging farmer focus on growing crops that people actually eat, want and use e.g. sugar beans, cabbage, maize and butternuts. Also, understand what size and varieties people prefer. If the crop has multiple uses that is always an added bonus. (e.g soy can be used for food and feed). If you do decide to grow exotics make sure you can sell them.

7. Warm or Cool Season Crop

Given how quickly it gets hot during the Spring/Summer in southern Africa it's important that you grow crops early. You can grow certain crops like rape/kale year round but be prepared for high pest pressure during the hot season. You may also need to use shade nets when it gets too hot for certain crops or they may bolt. Timing is everything in farming.

8. Your Budget

You need to make sure you can afford the production costs of the crop you are growing. Certain crops have high production costs (seed, fertiliser, labour, irrigation and many others) and are very expensive to produce without external funding.

If you can grow them under a good contract, then look into that. If you can't afford the production costs, then consider instead growing crops with lower production costs such as sweet potatoes or beans. You will avoid getting into debt and with beans, you have the added bonus of replenishing your soil!

9. Access to Water

Does your area get a lot of rain? How much rain? If you don't have a lot of water on your farm, focus on growing drought tolerant crops such as small grains, for instance, sorghum and millet or drought tolerant vegetables such as beans, okra or hot peppers. These crops can thrive even with restricted water.

10. Soil Type & Fertility

Assess your soil to see what you can grows best in your soil. If you have clay soils, you will need to amend with compost it if you want to grow carrots. Carrots prefer loose, sandy soils. Test your soil for your soil pH. Most vegetables require a soil pH of about 7.

Here are warm season crops you can grow in Zimbabwe:

- Tomatoes
- Beans (sugar beans, cowpeas, fine beans)
- Soya beans
- Maize
- Cucumbers
- Sweet Potatoes
- Pumpkins
- Butternuts
- Capsicum (Green, Red and Yellow, Peppers)
- Carrots
- Lettuce***
- Rape/Kale*
- Potatoes**
- Paprika
- Watermelon
- Spinach
- Cabbage*
- Sweet Corn
- Gem Squash
- Broccoli
- Cauliflower
- Herbs (for example, Rosemary, Thyme, Parsley, Basil)
- Eggplant
- Okra
- Small Grains (for example, Sorghum, Millet)
- Groundnuts/Peanuts
- Strawberries

— High pest pressure in the Spring/Summer which can increase costs and labour.

— Lower yields compared to winter crop

— Pick a seed variety that is good for warm weather to avoid problems

Keep a notebook or spreadsheet with good records throughout the growing season and evaluate how this went. Note down: what grew well, what sold well, what didn't work so well and use it to make decisions for next year.

Adapted from the Internet

Managing stillborn and mummified piglets

Introduction

PIG farmers always target to sell as many pigs from one breeding female per year as possible but pre-partum and intra partum deaths can reduce target numbers significantly. Pre-partum deaths can be classified into two categories — mummified piglets and stillborn that die a few days before farrowing. Intra partum stillborns are piglets that die during farrowing.

Sometimes, a stockman can confuse between stillborns, mummified piglets and early piglet mortalities. These should be differentiated appropriately to facilitate profiling of proper corrective measures to solve the problem. This article will help producers distinguish mummified, stillborns and early mortalities in the farrowing house.

Mummified piglets

Mummified piglets are those potential piglets, which die between 35–110 days of gestation, at different stages of development and will be farrowed together with the live piglets and stillborns if any. Mummies are easily recognised by their appearance. They are brownish/black in colour, and of varying length depending on the age when death occurs. The soft tissue will be decomposed but not the bone thus giving the "mummified" appearance. An acceptable range for mummified piglets in a litter is one percent, above which it becomes a real cause of concern.

Stillborns

Stillborns are fully developed piglets that are born dead. They die late in gestation, after day 110 or during farrowing when they suffocate as they move along the birth canal. Pre-partum stillborns die a few days before farrowing starts. These piglets will look fresh and will not be stained with feaces.as shown in the diagram below.

They died a few days before farrowing and were delivered normally together with other live piglets. On examining the eyes, corneal bluing is evident and post mortem examinations can show beginning of decay.

The intrapartum stillborn is that which dies during the farrowing process. The skin is stained brownish green with meconium (piglet faeces). The face might be covered in placental membranes. The umbilical cord of an intra-partum stillborn is normally long and wet. The piglet has slippers, which cover the feet of the foetus.

This will be proof that the piglet did not have a chance to move. The slippers protect the uterus and vagina from damage during farrowing. A live born piglet will scramble around and the slippers wear off within 15 minutes of birth. Some "dead piglets" have been found to have worn their slippers away thus they actually fall in the pre weaning mortality group as that indicates that they would have been born alive and died soon after birth.

Other differentiating post mortem findings

Lungs of a stillborn piglet will sink in water but those of a piglet which die soon after birth will float as the lungs would have been aerated. On examining the stomach of a stillborn piglet faeces can be found in the stomach but that which die after birth, milk can be noted as the piglet could have had its first suckle.

Piglet faeces can be found in the mouth, nostrils and trachea of the stillborn piglet. This arises as the faeces in the rectum is passed to the amniotic sac where it is inhaled by the dying piglet.

Causes of Mummified and stillborn piglets, preventive measures

1. Diseases- SMEDI

SMEDI is abbreviation for: S: Stillbirth; M: Mummification; ED: Embryonic Death; I: Infertility. It affects sows and gilts and is usually noticeable at farrowing. Boars can be responsible for the spread of the disease. The common symptoms for this disease are increases stillborn piglets, mummified foetuses, small litters and an unusual number of bred females returning to heat. The disease is caused by a group of parvoviruses. While there is no treatment, vaccination against parvovirus works very well as a preventative measure.

2. Dietary deficiency

Vitamin A deficiency has been associated with a high incidence of

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Figure 1: Prepartum stillborn piglet

Managing stillborn and mummified piglets

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stillborn piglets. Feed manufacturers balance for the requirements in their formulations. When formulating feed on the farm ensure that adequate minerals and vitamins are added in the feed. Some farmers have faced the problem as they ignorantly mix maize and soya only without balancing out for the minerals and vitamins.

3. Too long a farrowing period/farrowing problem

Farrowing duration is normal when it is 1-4 hours and should be less than 8 hours at most. In some cases, it becomes unusually long and this has been associated with high numbers of stillborn piglets.

It is advisable to ensure that a sow is in a fit condition for farrowing. Fat sows are usually lazy to push and they also tire easily and this becomes a predisposing factor to intra-partum stillborn piglets

Prolonged farrowing can result in the navel cord rupturing whilst the piglet is still in the womb and as a result the piglets are born dead. There is need to ensure that pigs are fed correctly and supplied with adequate water to avoid the sows getting constipated. When the water is from the nipple (automatic) drinkers the flow rate should be more than two litres per minute. If trough system is used, water should be provided all the time. There is need to ensure that the feed is not mouldy as mycotoxins in mouldy feeds can also result in increasing incidences of mummified and stillborn piglets.

Normally old sows, after parity seven (more than seven farrowings) are usually associated with longer farrowing periods and high incidence of stillborns. Culling should be considered. Individual sows with a challenge of stillborns can also be culled at an early age.

If piglets are too big or the birth canal is blocked by the piglets' position, farrowing can be prolonged and piglets can die during farrowing as a result. It is important for the stockperson to be in attendance when farrowing takes place so as to quickly give assistance when required.

4.Large litter sizes

Sows which carry very large litters at times give birth to mummies due to overcrowding in the uterus as a result of death of some of the foetus during gestation.

Figure 2: Intrapartum stillbirth

5. Environment

The right environment should be provided to avoid stressing the sow. In the farrowing house, the sow should not be exposed to environmental temperature above 20 degrees Celsius as high temperature will cause stress and lead to higher numbers of stillborn piglets.

CONCLUSION

The avoidance of mummies and stillborns can make a difference between sinking and swimming in the pig production business. Stillborns negatively affect sow productivity and consequently profitability.

Imagine getting a whole litter of stillborns. The feed and other costs incurred during pregnancy will therefore be a burden on other productive sows, and would have gone down the drain.

There is thus need to prevent mummies and stillborns at all costs.

SOURCE: Pig Industry Board (PIB)

Figure 3: Slippers on an intrapartum stillbirth

Figure 4: Feet of a live born piglet. No longer have slippers.

Figure 5: Mummified piglets at different stages of growth

Loading strategies for transporting cattle by road

PROPER preparation of livestock is essential for minimising stress and injury during transport. Cooperation and communication between everyone involved in the transport of livestock will:

- maximise animal welfare while livestock are in transit
- make sure livestock arrive at their destination in the best possible condition.

The responsibility for the welfare of livestock is shared among everyone involved in transport, including the consignor, transporter and receiver.

Key responsibilities

The consignor is responsible for:

- mustering and assembling livestock
- handling
- preparing livestock, including selection as 'fit for the intended journey'
- providing feed and water
- using holding periods before loading.
- The transporter is responsible for:
- loading
- ensuring appropriate loading density (excluding poultry)
- performing the final inspection as 'fit for the intended journey' during loading
- monitoring the journey
- performing additional inspections of livestock during the journey
- providing spelling periods during the journey
- unloading.

The receiver is responsible for:

- providing care after unloading.

Animal selection

Pre-transport preparation and selection is essential for successfully transporting livestock.

Livestock require time to settle down after mustering and handling in the yard. Animals should be well rested and hydrated prior to transport, particularly those intended for long distance transport.

Fit for the intended journey

Livestock that are not 'fit for the intended journey' must not be presented or loaded for transport, and instead withdrawn from transport and provided with appropriate treatment.

To determine fitness for a journey, consider each animal's:

- ability to walk bearing weight on all legs
- age
- pregnancy status
- body condition
- stress levels or injury status
- ability to see.

Feed and water

The maximum time livestock can be kept from water and feed varies with species, age and reproductive status. When livestock have reached their maximum time off water, they must be spelled before continuing the journey.

Any livestock intended for journeys longer than 24 hours must have accompanying records that show when they had access to water during transport.

If there is a mixed load of animals (including various age groups or species), the maximum time off water is determined by the animal that needs access to water soonest.

Spelling

Spelling, providing food, water and rest, is vital to ensure livestock are fit to continue the journey. The code of practice for livestock transport outlines the minimum spell periods that livestock must receive before continuing a journey. The spell period begins when the livestock are unloaded and ends when they are handled for reloading.

Handling

The stock handler's attitude and actions can determine if transport of animals is successful. Livestock travel better when they are quiet, and segregated by size, gender and horn status.

Correct livestock handling reduces bruising and stress. Skilled stock handlers who work livestock without noise and bustle reduce animal stress.

Livestock must be handled in a way that minimises stress throughout the transport process.

Loading densities

Appropriate loading densities depend on the age, size and reproductive status of the livestock, as well as weather conditions and the distance to be travelled. Loading densities must be assessed for each crate or container to ensure the animals give each other mutual support.

Appropriate loading densities reduce stress, bruising and deaths during the journey. Overloading increases the risk of an animal going down and being unable to get up again. Downer animals (unable to stand) significantly increase the risk of bruising, injury and mortality.

Animals must be fit for the intended journey and no person must transport or cause an animal to be transported in a way likely to cause injury or undue suffering.

The Regulation does not apply to the transport of animals when not in connection with an economic activity or to the transport of invertebrate animals. However, a general duty-of-care provision exists, protecting invertebrates and animals involved in non-commercial movements from injury or unnecessary suffering.

Principal requirements

All persons who transport animals, however far, have a duty to ensure that the animals are transported in a way that is not likely to cause injury or unnecessary suffering. They must be transported in a means of transport and under conditions that are suitable for that animal.

Farmers transporting their own animals must ensure that:

- no person transports an animal or causes animals to be transported in a way that is likely to cause injury or undue suffering
- all necessary arrangements have been made in advance to minimise the length of the journey and meet the animals' needs during the journey the animals are fit for the journey
- the means of transport (including the means of loading and unloading) is designed, constructed, maintained and operated so as to avoid injury and suffering and ensure the safety of the animals (see 'Means of transport' below)
- the personnel handling the animals are trained or competent in the transport of animals
- the transport is carried out without delay and the welfare conditions of the animals can be checked during the journey
- sufficient floor area and height is provided for the animals
- the animals are watered / fed and rested at suitable intervals as necessary

Fitness of animals for transport

Animals must be fit for the intended journey before the journey starts and must remain sufficiently fit throughout the journey.

Animals that are injured, weak or diseased must not be considered fit for transport, particularly if they:

- are unable to move without pain, or to walk unassisted
- have a severe open wound or prolapse
- are pregnant females for whom 90% or more

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A proper loading ramp

Loading strategies for transporting cattle by road

Cattle need adequate space to stand comfortably

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- of the expected gestation period has already passed, or they are females who have given birth in the previous week
- are newborn mammals in which the navel has not healed
- have been submitted to veterinary procedures in relation to farming practices such as dehorning or castration and the wounds have not completely healed

Sedatives must not be used on animals to be transported, unless under veterinary supervision.

If any animals do fall ill or become injured during transport they must be separated, given appropriate veterinary treatment and if necessary undergo emergency slaughter or killing in a way that does not cause them undue suffering.

Transport requirements for young animals

Appropriate bedding must be provided for:

- piglets of less than 10 kg
- lambs of less than 20 kg
- calves less than six months old

The bedding material must provide comfort appropriate to the species and ensure adequate absorption of urine and faeces.

Means of transport

The means of transport must be designed, constructed, maintained and operated so as to :

- protect the animals from pain and injury
- protect the animals from extreme temperatures and adverse changes in climatic conditions
- allow each animal adequate ventilation
- permit access to allow the animals to be inspected

The means of transport should:

- provide anti-slip flooring
- have barriers to prevent animals falling and escaping from any upper floors and lifting platforms
- provide partitions strong enough to withstand the weight of the animal
- have fittings designed for quick and easy operation

Vehicles must carry suitable equipment for loading and unloading. The vehicles' surface, including the loading and unloading equipment, must enable cleansing and disinfection between journeys. For vehicle cleansing and disinfection requirements please refer to 'Cleansing and disinfection of vehicles'.

Ramps must not be steeper than an angle of 20° (36.4% to the horizontal) for pigs, calves and horses; and an angle of 26° 34 minutes (50% to the horizontal) for sheep and cattle other than calves.

Where the slope is steeper than 10° (17.6% to the horizontal) ramps must be fitted with a system such as that provided by foot battens, which ensure that the animals climb or go down without risks or difficulties.

Planning obligations

Before commencing a journey, transporters must ensure they have the following in place:

- necessary arrangements have been made in advance to minimise the length of the journey and meet the animals' needs during the journey (as provided in the information above)
- transport authorisations. Anyone transporting animals over 65 km (approximately 40 miles) must hold a transporter authorisation. A certificate of competence for the species being transported is required for anyone either driving or attending to the animals during transport. For more information please refer to 'Transporting livestock by road: paperwork'
- anyone transporting cattle over 50 km (approximately 31 miles) must carry an animal transport certificate. The movement of pigs, goats and sheep must always be accompanied by a movement licence. More information can be found in 'Transporting livestock by road: paperwork'. Businesses transporting livestock over eight hours must have their vehicle approved and keep a journey log
- arrangements have been made to ensure specified legal journey time limits can be met. For more information please refer to 'Farm animal transport journey times'

Personnel

An attendant must accompany the animals, except where the driver performs the functions of an attendant. All attendants must hold a certificate of competence for the species of animals transported. More information can be found in 'Transporting livestock by road: paperwork'; this guide also includes information on transporting livestock to (or through) the EU.

When handling the animals, attendants must not:

- strike or kick the animals
- apply pressure to a particular sensitive part of the body to cause unnecessary suffering
- suspend the animals by mechanical means
- lift or drag the animals by the head, ears, horns, legs, tails or fleece
- use prods with pointed ends
- obstruct any animal being driven or led

SOURCE: 2023 Chartered Trading Standards Institute

Getting the most out of artificial insemination

Eddington Gororo

Chinhoyi University personnel carry out AI activities for communal farmers

Introduction

THE production of offspring is central to the technical and economic efficiency of livestock enterprises of any scale and orientation. It may be the most important driver for profitability, sustainability and productivity on a livestock farm. Any livestock farmer makes money out of the number of offspring (calves, lambs, kids and so forth) born and reared to market age and weight. Without calves, a cattle farmer has no business. Therefore, reproductive performance should never be left to chance.

Most cow-calf herds have lower reproductive performance in Zimbabwe. This is reflected in long age at first calving (AFC) for heifers of 31-36 months, low annual calving rates (CR, 39 percent), long intervals between successive calves (ICP, 21-24 months) and poor wean weights (Gororo et al., 2017). With good reproductive management, calving rates must be above 75 percent while each cow should drop a calf every 12-14 months. Failure to reach these performance norms means that the farm is carrying passengers in the form of empty unproductive cows. The farmer has to intervene to achieve desired reproductive outcomes.

AI as an option

There are three major breeding strategies that can be used to put cows into calf viz, use of natural service (NS) bulls, artificial insemination (AI) and a combination of these two options (AI + NS). Use of herd bulls over a specified breeding season (BS) or all year round is the traditional way to breed beef cows in this country. Each year, a large proportion of cows remain empty due to shortage of affordable good quality bulls. In addition, it is not feasible and uneconomic to keep expensive bulls that remain under-utilised.

Thus, the AI option can be used to complement or substitute NS bulls, depending on farmer circumstances. Farmers neither incur bull purchase and maintenance costs, nor face risks associated with keeping live bulls on the farm. Instead, the farmer pays only per service of each cow. Flexibility in the type and number of bulls that can be used each season is a huge benefit for incorporating AI in a farm reproductive management program.

When AI and NS bulls are used in combination, conception rates can be quite high. Cows and heifers that don't take to AI may then be covered by herd bulls. This permits use of fewer bulls on the farm. In addition, breeding seasons and calving seasons may be shortened, thus producing uniform calf crops.

Low pregnancy rates following AI remain a major deterrent to wide-scale use of the technique in beef cow-calf herds. Global benchmarks point to conception rates to a single insemination averaging 50-55 percent and 60-70 percent in beef and dairy cows, respectively. On average, 1, 5 to 2, 0 inseminations may be needed per pregnancy. However, unfavourable conception rates as low as 35 percent have been reported for AI projects carried out in various parts of our country. However, proficiency of inseminators has significantly gone up in recent times, for instance, an average of 65-70 percent take to insemination following heat synchronisation is achieved in AI projects carried by Chinhoyi University of Technology.

Critical success factors for AI

There are a number of important pre-requisites before one can contemplate using AI on their own farm. These include semen quality and supply, storage and handling of the semen, fertility of the cow, heat detection, and a means for inserting the semen into cows in heat. For high AI success outcomes, efficiency in all these reproduction factors must be high as well.

Semen supply

A ready supply of affordable good-quality semen is an important pre-requisite for AI. A farmer needs to use semen from superior bulls that can improve his or her animals. If a farmer cannot access semen, AI would never be a breeding option. At present, high quality frozen semen doses from locally bred pedigree bulls can now be sourced within the country. Price of the semen is also important, as it adds to the cost per pregnancy.

A farmer may elect to keep their own semen on the farm, and hire the AI technician when needed. In this case, there is need for specialised equipment such as liquid nitrogen flasks and ready access to liquid nitrogen gas to maintain viability of the semen. In the case that a farmer is using an AI service provider, the responsibility for storage and handling the semen lies with the service provider.

Heat detection

Cows may only be inseminated when they are in standing heat. Timing of insemination, with respect to the reproductive cycle of the cow, is a critical factor for fertilisation success. It must coincide with release of the egg. A herdsman must be tasked with heat observation, and must note animals that are showing signs associated with heat.

Many heats tend to be silent or go unnoticed, reducing heat detection efficiency. This is a big problem with local breeds, in which intensity of heat is low, heat period is shorter and occurs mostly during the cooler hours of the night. On many farms with observant stockmen, only 50-60 percent of cycling females are observed to be on heat. The rest are missed.

However, heat detection efficiency may be improved through use of commercial heat detection aids or estrus synchronization (ES). Synchronisation seeks to bring a group of cows and heifers into heat around the same time. All cows may then be inseminated at once, or over a three-to-five-day window following heat detection.

Cow fertility

Cows that are not cycling or sub-fertile will not get pregnant even if given the best semen or bull. The female side of the AI success equation is influenced by health status, infections of the reproductive system and body condition of the cow. Cows that are sick, have poor welfare, or are in poor body condition will usually not show regular signs of heat. Cow side factors are largely controlled by the management of the farmer. This probably explains the large variation in AI conception rates across different farms.

Inseminator proficiency

For success, an artificial insemination kit and expertise in using it is required. Semen must be inserted on target, in cows that are in heat, within the shortest possible time and without harming or infecting the recipient cow. A number of people are offering AI services to farmers for a fee. However, their proficiency may not be ascertained. Inseminator skill is acquired through training, but proficiency comes through practice.

Conclusions

Artificial insemination is a good option to get cows pregnant and bring new genetics into the herd. It can be used solely or in combination with herd bulls to achieve high conception rates, and shorter inter-calving periods. The service is available for individual farms, communities and organised farmer groups. However, the level of success with AI depends on the inter-play between four major variables: viability of the semen; heat detection efficiency; proficiency of the inseminator; and fertility of the cow. The last variable is the most important and most varied, and depends on farmer management.

About the author

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When farming is part of the family DNA

Edgar Vhera
Agriculture Specialist Writer

FOR the Samudzimu family of Pepsia Farm in Goromonzi, Mashonaland East, farming is an occupation of optimism, the wisest form of experimenting that turns earth and even manure into gold, rewarding the grower with wealth and good health.

It is something that runs in the family's genetic make-up with generation after generation passing it on to the next.

Such is the story of Zivai Memory Samudzimu (nee Mzila) who, after being born and bred in a farming family, went on to pass that passion to her twin daughters who have subsequently transformed their financial literacy into successful agriculture with value addition in sight.

Zivai is married to Benson Samudzimu. Their 24-year-old twin daughters, Michelle and Charmaine graduated with first class degrees in Financial Economics from Birmingham University in United Kingdom (UK). And in line with the family's farming DNA, the twins have traded life abroad the country and their white-collar jobs for a dance with the land assisting in managing their family farming business as well as running their own lucrative white mushroom project in six rooms producing 600 kilogrammes of the crop in six flashes.

Zivai is full-time on the farm while her husband works in the corporate world.

How did she start?

"My parents had a 600-hectare commercial farm in Midlands province and owned a truck they used for ferrying grain to the Grain Marketing Board (GMB). Our livelihood was derived from agriculture production and after marriage I had the zeal to continue with farming but had no farm to do so on," said the mother of twins.

The advent of the land reform programme in 2000 enabled her to actualise her dream, as she and her husband were allocated the 200-hectare Pepsia Farm in Goromonzi under the A2 category. It has 165ha of arable land.

"We inherited land that had no developed irrigation infrastructure so we would rent such structures from neighbours. Eventually, we constructed our own dam seven kilometres away from the farm and drew irrigation water from there.

"We proceeded to build a staff compound, canteen, toilets, shed house, offices while developing irrigation infrastructure starting with lateral pipes," she said.

For expanded irrigation, the Samudzimus constructed a reservoir on the farm that holds 50 mega litres of water, which is filled from boreholes and water drawn from rivers. The farm now has two 40ha centre pivots, one 20ha centre pivot and three 10ha centre pivots.

"Our centre pivot system can irrigate 130ha, while an another 40ha can be added by connecting lateral pipes for irrigation. We also get supplementary irrigation from the mainline that is used by other commercial farmers and villagers," Mrs Samudzimu said.

They had 125ha under various crops for the 2021/22 summer season.

"For the 2021/22 summer cropping season we did seed maize on 30ha and produced 180 tonnes at an average yield of six tonnes per hectare. We also planted 80ha seed soya beans and got an average yield of 5, 3 tonnes per hectare. However, this yield could have been better if the crop had not been affected by incessant rains that caused massive flower drop with prolonged cloud cover causing reduced pollination," she said.

Pepsia Farm is a family run business by the Samudzimu family. From left, Charmaine, Benson, Michelle and Zivai Memory Samudzimu

We realised an average yield of 15 tonnes per hectare under dryland commercial maize in the same season.

For the 2022 winter season, they planted 40 hectares of wheat achieving average yields of nine tonnes per hectare.

With the Government addressing the electricity issue this year through ring-fencing power supply for wheat clusters and increasing local power generation from both hydro and thermal sources, Pepsia Farm has increased its winter wheat hectarage by 200 percent and planted 120ha for the 2023 season.

"Guaranteed electricity supply by Government has allowed us to triple area under wheat to 120ha this winter season from 40ha last year. I am forecasting yields that surpass the nine tonnes per hectare we achieved last season," she said.

Pepsia Farm fully utilised all the arable land during the 2022/23 summer crop season as 30ha were planted under seed maize, 80ha to seed soya beans, 30ha commercial maize with sugar beans and potatoes on 20ha and 10ha respectively.

A total of five hectares are under citrus (orange, lemons and nartjies). Recently the national trade development and promotion organisation of Zimbabwe (ZimTrade) boosted their citrus breakthrough by visiting the farm and offering technical advice and scouting for external markets for their citrus products.

The Samudzimus have also embraced the Government's call to grow the national cattle herd with a current flock size of 165 cattle. Pepsia Farm slaughters between 30 and 40 head of cattle for sale at private abattoirs every year to get an additional income. They also have sheep.

Pepsia Farm employs up to 100 contract workers during peak periods of seed maize de-tasselling and potato harvesting with three quarters of the workers being women. The few men employed are mainly in the security department, driving and lifting of heavy objects.

Zivai's lowest moments were when load-shedding ruined winter wheat and seed maize crops last season. This significantly increased the cost of production as she had to use diesel to power generators for use in irrigation, which was expensive and ate into potential profits. Even her daughters' white mushroom project was also hit hard, as the farm did not have solar system to use for back-up power. Load-shedding affected production, productivity, produce quality, air conditioning and cold rooms' performance.

Achievements

They have managed to develop basic infrastructure and irrigation facilities on the farm and improved mechanisation levels through procuring six operating tractors and five trucks (one thirty-tonne, two ten-tonne and two three-tonne trucks).

Zivai admits her farm is now focusing on growing income from sale of produce, which can only be enhanced through selling better priced valued-added products.

"We are seriously considering to make Pepsia Farm a seller of valued-added products like jam, marmalade, juices, chips and properly packaged mushroom cuts.

"Focus will initially be on the domestic market but with the ultimate aim of exporting to regional countries taking advantage of the African Continental Free Trade Area (AfCFTA) that is opening borders to trade," she observed recently.

Pepsia Farm wants to increase crop and livestock productivity through use of precision agriculture technology.

As part of new technology, they have acquired moisture probes that analyse water use by plants for cost effectiveness.

With the farming experience Pepsia Farm has gained over the years, Zivai believes they have potential to undertake production on 1 000ha of land.

As a word of advice to fellow women farmers, Zivai believes passion is a key factor adding that the farmer has to be on the ground always and take farming as a business, not a hobby.

Women farmers must seriously participate in agriculture production under the Agric4She programme being spearheaded by the First Lady to increase food and nutrition security for their households and the country at large, she said in parting.

Rudolf Mabuya

Sustainable crop production under float tray system

Wire stand method

Floating method

INTRODUCTION

CROP seedlings, including horticultural, tobacco and trees can be produced using two methods. The conventional system involves construction of raised beds on the ground, on which seed is sown at a recommended density. However, with this method, the beds had to be sterilised using methyl bromide to control weeds and diseases.

After methyl bromide was phased out to reduce damage to the ozone layer by the Montreal Protocol (United Nations Environmental Programme; (UNEP), 1987), an environmentally friendly method of seedling production was developed. The floating tray technology is a hydroponic system where an artificial growing media (seedling starting mix plus) in polystyrene trays is used thus eliminating the need for usage of methyl bromide.

The artificial media has the appropriate particle properties and has a stabilised and controlled pH and cation exchange capacity (CEC). These properties provide full support during the growth of the seedlings by permitting gaseous exchange, moisture availability, root support as well as nutrient availability.

Why is it important to have good quality seedlings?

The quality of any crop seedlings determines early growth and successful establishment of the desired optimum plant population for a particular agro-ecology. Crop yield and resource use efficiency depend on successful plant establishment in the field, and it is the vigour of seedlings that defines their ability to establish rapidly, uniformly, and robustly across diverse environmental conditions.

The establishment of a good stand which achieves full ground cover as early as possible is a crucial determinant of crop yield as it increases leaf area duration or the summation of leaf area exposed to incoming Photosynthetically Active Radiation (PAR) during the growing season.

Hence, the gain in plant dry weight per unit of land and time is directly proportional to the amount of PAR intercepted. Poor quality crop seedlings often lead to establishment of poor stands, which reach full ground cover (Leaf area index at which 95 percent of incoming radiation is intercepted by leaves) later in the season or completely fail to reach full ground cover during the season. This means a proportion of incoming radiation is not intercepted by leaves and converted to dry matter and economic yield.

Seedling losses as a result of poor-quality crop seedlings result in plant populations that are less than optimum, meaning that the number of plants per unit area is less than those required to fully utilise the resources (PAR, water and mineral nutrients) in the environment or agro-ecology. The net photosynthesis is maximal when foliage is dense enough to intercept maximum solar radiation and prevent it from striking the soil.

Farmers who have poor stands and low final plant populations therefore automatically start from a reduced target potential yield and no matter what they do later in the season, they will not recover the yield potential lost by failure to fully utilize resources in the environment to produce dry matter and economic yield. Hence, transplanting poor-quality seedlings into the field waste space and resources thus low site productivity.

Installation of float tray system

The float tray system set is mainly installed using two methods which are the floating method and or establishing a wire stand which allows trays to sit but allowing root growth at the same time.

1. Floating method

This method is mainly used in tobacco and tree seedlings. However, there are a few horticulture seedling nurseries who have adopted it as well.

Steps in establishing a float bed

i. Work your ground to get rid of stones, sticks and any other sharp objects which can cut or pierce the plastic
ii. Level your ground using a rake. A spirit level is also a must to make sure your ground is 100 percent even (to ensure that water is evenly distributed throughout the float bed)
iii. Use your float trays as guidance as you establish a two-course wall of farm bricks either loose laid or permanently set in position using mortar
iv. The bed is lined with black plastic (250 micron) which is at least 0.5 metres wider and longer than the inside dimension of the bed so as to allow the plastic to be laid over the top of the wall bed and at least partially down outside the wall
v. Fill the bed with water to a depth of 10 centimetres and the plastic should be flat against the bottom and firmly held between bricks and
vi. Neatly float your media filled trays without any spaces allowed between them so as to prevent sunlight from reaching water thus preventing algae growth.

2. Wire stand method

This method is only used in horticulture seedlings production under green houses and is not ideal for tobacco and tree seedlings. Wire stands are established with the support of wooden poles at least 1, 5 m above the ground. Seedling float trays are then neatly arranged to sit on top of wire strands. Water is supplied to the seedlings by means of overhead irrigation.

Advantages of using float trays

The artificial medium system of seedling production has several advantages over other seedling production alternatives. It uses fewer chemicals and in smaller quantities, employs economical integrated management of diseases and pests, uses less water and fertilisers and produces superior more uniform crop seedlings that can withstand transplanting shock.

Again, under the conventional seedling production system, a farmer requires 100 square meters to produce seedlings for one hectare, whereas a relatively smaller portion is needed when using an artificial medium (72 trays under float tray system) to produce uniform seedlings for the same area. Moreover, growing media used in this system is said to be biologically active and suppress some diseases. The float seedling production system offers additional flexibility in planting following pulling and facilitates easier field management, arising from a more uniform crop. The yield and quality for a crop established using float seedlings is better than conventionally produced crop seedlings.

For establishment of the float tray system a farmer needs float trays, growing media and water.

Float trays

Maintenance

After a seedling production cycle, the float trays should be washed using copper oxychloride or detergents and kept under a shade away from rats.

Mabuya is an agronomist with New Horizon Ventures. He is a holder of a B.Sc. Honours in Crop and Science Technology degree.

Crop Management Guide

Kundai Bret Andy Mandizvidza			
Tomatoes			
Week	**Fertilisers**	**Insecticides**	
Week1 Crop establishment No visible growth the tomato seedling has been transplanted and adapting to the ground.	Land preparation and fertigation =Open trenches that are 25cm deep and fill with well decomposed manure at 4 x 20l buckets per 50m line. = Dig in the fertiliser and manure and apply lambda as a spray or drench to control white grubs. =Apply comp c at a rate of 3,5kgs per 50l over the manure. =cover the trench until it is level	=drench in lambda for cutworms. =Apply a second layer of comp c at a rate of 5kg per 50m line. =at day 4 control grasshoppers through acephate, carbaryl acetamiprid	=apply copper oxychloride or equivalent as full cover spray.
Week 1			
Day 7 AN is applied 5cm away from the crop to avoid fertiliser burn	=At day 7 top dressing =AN is applied at 5g per plant =One can apply AN through fertigation. =commerce foliar sprays at day 7		
Week 2 Early growth Visiaxble			
Day 14 Nitrogen supplementing To supplement phosphorus	= at day 10 apply M.A.P =at day 14 apply second top dressing =apply quick start	=apply a second spray of grasshopper as full cover of acephate, carbaryl; acetamiprid or equivalent	=apply Mancozeb or similar products as full cover spray
Week 3 First flowers maybe noticed Nitrogen supplementing	=at day 21 apply top dressing AN at 5g per plant. =apply foliar spray of quick grow	=scout for tuta using ampligo, belt, nemesis, =Scout red spider using abamectin =scout for whitefly Indoxacarb, thunder, acephate and dimethoate	=apply bravo or similar products
Week 4 Rapid vegetative growth Calcium nitrate its of paramount importance in improving shelf life and reduces blossom end rot	= at day 28 apply calcium nitrate at 5g per plant =scout for tuta using ampligo, belt, nemesis,	=apply foliar spray of best bloom =scout for red spider using abamectin =scout for whitefly using thunder, acephate	=apply folicur, evito, inifinito spray as preventive
Week 5 Prolific flowering and fruiting Potassium nitrate	=at day 35 apply potassium nitrate at 8g =apply win bloom	=scout for tuta using ampligo, belt, nemesis, supplementing =scout for red spider using abamectin =scout for whitefly using thunder, acephate	=apply Mancozeb
Week 6 Fruiting and flowering	=at day 42 apply potassium nitrate at 8g =apply win bloom	scout for tuta using ampligo, belt, nemesis =scout for red spider using abamectin =scout	=apply copper oxychloride
Week 7 Determinate varieties stop growth. Fruiting and flowering	=at day a apply calcium nitrate at 5g per plant =apply best bloom =apply magnesium at 5g per plant	=scout for tuta using ampligo, belt for whitefly using thunder acephate	= apply folicur
Week 8 Fruit growth and maturity	=at day 56 apply potassium nitrate at 8g per plant. =apply foliar of best bloom.	=scout for tuta using ampligo, belt, nemesis	=apply bravo
Week 9 =apply foliar spray of best bloom. =scout for whitefly using thunder.	=at day 63 apply potassium nitrate at 5g per plant	=scout for tuta using ampligo, belt, nemesis	=apply folicur
Week 10 Apply foliar spray of best bloom.	At day 70 apply potassium nitrate at 5g per plant =scout for whitefly using dimethoate	=scout for tuta using ampligo, belt, nemesis	=apply bravo
Week 11 =scout for whitefly using dimethoate	At day 77 apply best bloom	=scout for tuta using ampligo, belt, nemesis	=apply folicur
Farmers are recommended to take soil samples for accurate type and quantities of fertilisers This is a generalised recommended fertiliser programme. Mandizvidza is horticulture consultant - 0784703544\0712841993			