ZIMPAPERS
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KEEPING FIELDS WEED & PEST FREE

Managing pests and plant diseases

PESTS, plant diseases, and weeds can be serious threats to crops. Chemical companies say the only solution is to spray pesticides regularly. But chemicals may cause more problems than they solve. Sustainable farming works with nature to keep crops, pests, diseases, weeds, and soil life in balance. This is called natural pest management or integrated pest management (IPM).

Natural pest management prevents problems with pests and plant diseases, and keeps harmful chemicals out of our bodies and environment. It also avoids problems of chemical dependence and pesticide resistance.

Even if you are willing to use pesticides, it is still important to know if pests are harming your crops, how much damage is being done, and whether creatures in the fields are already controlling the pest. Then you can decide if and when to use chemicals, and what kinds to use.

The best way to control both pests and diseases is to keep plants healthy.

- Build healthy soil. Healthy soil provides a home to friendly insects and helps prevent many plant diseases.
- Plant resistant varieties. Ask farmers or extension agents about seeds to make sure the ones you choose are resistant to common pests and diseases.
- Space plants correctly. Planting crops too close together limits the sunshine and air that reaches the leaves, and allows diseases to thrive. But planting crops farther apart leaves room for weeds, dries the soil, and may reduce the harvest. Experiment to see what spacing works best for each crop.
- Plant at the right times. Pests and diseases often respond to the weather, such as the first rains or the first warm day. Watching how each crop grows and talking with other farmers about these patterns can help you decide the best time to plant. Planting earlier than usual can make sure crops are big enough to resist pests or diseases that come at a certain time. Planting later can cause most of the pests or diseases to die out for lack of food.
- Plant a variety of crops and change crop patterns. Large areas with only one kind of plant attract pests who like that plant.
- Water from below. Watering from above can cause diseases that live in soil to splash onto plants. And wet leaves and stems are good places for diseases to grow. Using drip irrigation or flood irrigation can keep plant leaves and stems healthy.


African Bollworm

Look for pests

Plant-eating insects are a normal part of farming. They cause little harm to crops as long as they remain in balance with other types of insects, especially those that eat pests.

Examine your crops regularly. This will help you understand when to allow friendly insects to do their work, and when you might need to spray with natural pesticides or use other pest control methods. When you look for pests and diseases, ask questions such as:

- Are pieces of the plant being eaten by an insect?
- Is damage increasing? Will it affect the crop yield?
- Are friendly insects keeping pests under control?

Is it a pest, a friend, or harmless?

Sometimes the insects easiest to see are protecting plants by eating the pests. Or, the plant may be at a stage of growth where it can withstand some pest damage and remain healthy.

Worms are important for healthy soil. Bees, spiders, and most insects that live in water (such as in rice paddies) are friends, and help control pests. Also, small wasps or flies with long, thin tubes at their backside are probably friends. It is best to leave insect friends alone so they can help your crops.

Watch the insects in your fields to know if they are pests, friends, or harmless. If you are unsure about some insects, collect them in a container together with some plant parts, and watch them for several days. If you find insect eggs, watch what they hatch. If tiny worms or grubs (larva) are released, they may be pests. If they release flying insects, they are often friendly.

The main ways pests damage crops are by sucking the liquid from them and by eating them.

- Sap-suckers include aphids, scale insects and mealy bugs, leaf and plant hoppers, white flies, thrips, mites, and nematodes.
- Plant-eating insects include caterpillars, slugs, snails, plant and pod borers.

If it is a pest, how can you get rid of it?

Once you know how the pest damages crops, you can use natural pesticides made for that kind of pest.

Once you know when the pest appears and how it relates to its environment, you can use physical methods of pest control. Answers to these questions can help know how to control a pest: Where does it come from? When does it damage crops? Does it appear in one form and then change to another form (for instance, caterpillars turn into moths and butterflies)? Is it food for birds, other insects, or field creatures?

Spray with natural pesticides

Natural pesticides prevent crop damage with much less harm to people and the environment than chemical sprays. They are easy to make and cost less than chemicals.

But even natural pesticides must be used with care. Never use more than you need. Always wash your hands after handling them. Always wash food before eating or selling it. A natural pesticide may work well in some conditions but not in others. If one kind does not work, try other kinds.

Natural pesticides for plant-eating insects

1. Collect the plant you want to use, let it dry, and grind the dried plant to a powder.
2. Soak the powder in water overnight (one handful of powder to one litre of water).
3. Pour the mixture through a screen or cloth to remove solids.
4. Add a little bit of mild soap to help the pesticide stick to plants.
5. Spray or sprinkle the mixture on plants. Test your mixture on one or two plants first. If it seems to hurt the plants, it may be too strong. Add more water and test it until it seems good.
6. Repeat as needed, and after it rains.

Natural pesticides for sap-sucker insects

Sap-sucker insects are killed by coating them with mild soap or oil that blocks their breathing holes. Spraying plants with mild soapy water or water mixed with vegetable oil will kill these pests. Do not use detergents or strong soaps because they damage plants, soil, and insects.

Other natural pesticides

Urine diluted in water and sprayed on plants kills pests. Mix one cup of urine with 10 cups of water. Let it sit in a closed container for 10 days. After 10 days, spray the mixture onto your crops.

Tobacco kills many pests. Boil one cup of tobacco leaves or cigarette butts in five litres of water. Strain out the leaves or butts, add a little soap, and spray it on plants. Do not use tobacco on tomatoes, potatoes, peppers, and eggplant. It will damage these plants and will not kill most pests that attack them.

IMPORTANT! Tobacco juice is poison! Avoid getting tobacco juice on skin or clothes. Avoid breathing the steam while boiling tobacco leaves.

Physical methods of pest control

Watch the animals in your fields to know if they control pests.

There are many ways to control pests, or to encourage predators and parasites, based on their habits and life cycles. Talk to other farmers to learn about methods they use.

Animals and insects

Many birds, bats, snakes, and insects eat pests and pollinate crops. You can tell what a bird eats by the type of beak it has and by watching how it acts in your fields. To scare off birds that are eating crops, some farmers hang shiny things such as shiny paper, tape from old cassette tapes, and scraps of metal near crops.

Most bats eat mosquitoes. But some bats eat fruit and a few others bite animals. By watching them eat, or by looking at the remains of their food under the place where they sleep at night, you can tell if they are eating the fruit off your trees or are eating the insects that bite you or eat your crops.

Some physical methods of pest control

To control fruit flies, put some rotting fruit in a plastic bottle with fruit-fly-sized holes in it. Hang it from the fruit tree you want to protect about six weeks before the fruit will be

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Dr Suzette Bezuidenhout

Weed management principles for maize

Weed infested field

WEED control is essential to achieve optimal maize yields. The first crucial period for weed control is from planting to six weeks of growth.

At planting, it is recommended that the seedbed must be weed-free. The maize will generally germinate after five to seven days, during which time the seedlings are very vulnerable to weed competition. Weeds compete with the maize for nutrients, water and space. They are more adapted to competition and, if not controlled, the maize yield will decline.

Weed management mainly focuses on annual weeds than perennial weeds. Annuals complete their lifecycle from seed to seed in less than one year or in one growing season. They produce an abundance of seeds, grow quickly and are usually, but not always, easy to control, for instance, pigweed, common blackjack and gallant soldier.

Perennials are divided into two groups — creepers and simple perennials. Simple perennials spread only by seed. If the shoot is injured or cut off, it may generate a new plant vegetatively but reproduction is normally done by seeds.

Creeping perennials reproduce by seed and vegetative plant parts. These include aboveground stems (stolons), below-ground stems (rhizomes), tubers, aerial bulblets and bulbs, for example, yellow nutsedge.

Make use of an integrated weed management programme, combining cultural, mechanical and chemical methods.

Weed management principles for maize

Cultural methods

Ask your local seed distributor for maize cultivars that are adapted to your region. Using high-quality maize seed will aid in reducing weed competition. Healthy, vigorous crops are always more competitive than slow-growing crops or those with poor stands. Changing planting dates can be implemented to avoid weeds germinating at certain times. If maize is planted in narrow rows (0, 75 m), quicker canopy closure is promoted, which will reduce weed growth and water loss.

Increasing plant populations can often decrease weed densities and growth. Gaps in the field provide weeds with an opportunity to establish and spread. If grasses tend to be the most dominant weeds, rotate the maize with a broadleaved crop such as soya beans. More grass herbicides are registered on soya beans than on maize and this will allow better grass control. Mechanical methods

Tillage controls weeds by burying them, separating shoots and exhausting the carbohydrate reserves of perennial weeds. Killing the initial flush of weed seedlings can make further weed control much easier to achieve. Maximum control is achieved when cultivation takes place after weeds have germinated but before they emerge, because best results from cultivation are obtained with small weeds.

Larger weeds are difficult to bury and have sufficient roots to escape total separation from the soil. Effective cultivation needs dry soil, both at the surface and below the depth of cultivation. Dry soil promotes desiccation of the uprooted weeds. Cultivation while the soil is too wet will simply transplant weeds, especially the vegetative reproductive organs of perennial weeds.

Mulching excludes light and prevents shoot growth. Weed seedlings emerging from the soil are killed through starvation from a lack of photosynthesis. Light-promoted weed-seed germination may also be inhibited under mulch. Thick, wide mulches are required to control perennials that creep to the edge of a mulch and emerge. Mulches decrease soil temperature and may promote better plant growth. In no-tillage production systems,

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Editor's Note

GROWING up in the dusty communal lands of Mhondoro, I vividly remember those moments when my late mother (MHDS-RIEP) would come home from the fields with a basket full of green mealies. This would be happening a week before Christmas mostly or she would wait until the big day to serve the mealies as part of our dessert after the main meal that would obviously comprise a roadrunner chicken and rice.

The green mealies would have been plucked from our earliest planted crop and we would gather around the fire place to roast one or two cobs before the rest would be boiled for everyone to enjoy later.

Rainfall patterns were predictable then and farmers would dry plant every beginning of October and that crop would survive on the sporadic showers that would characterise the month. Our soils never got too dry to support plant life then and droughts were not regular visitors to our shores.

Today, all that has been relegated to a very faint and distant memory with first signs of meaningful rains taking shape as late as end of December or January in some cases. And this obviously means that the first mealie cobs from our fields would be ready for harvesting sometime in March or early April.

There was something we would also religiously do in our fields – weed control. This was and still remains a very important activity that you need to do to make sure you have good yields.

You need to have integrated weed management strategies such as mechanical cultivation, organic mulches, plastic mulches and crop rotations in place. I know you all understand that weeds are good indicators of the condition of your soil and when look at a piece of land and see certain weeds, you automatically tie those weeds to soil and ecological site conditions. For now, forget about trying to understand what your soil is doing to support the growth of those weeds germinating alongside your crops and choose a way of dealing with them before they become a bigger menace. You can still do whatever you have to do to correct your soil's condition later after you have freed your crop from the weeds' stranglehold.

Choose the most appropriate way of dealing with the weeds from your coterie of weed management strategies. This should be a method that ensures that the weed problem goes away and gives the crop a chance to grow productively. Of course some of you are now banking on the use of herbicides to control weeds but always remember that there are different types of the chemicals. You also need to be very sure on the correct methods of application. If you are not sure just swallow that pride and seek guidance from your extension officers. Remember the end justifies the means. If you end up with a good harvest after you would have enlisted the help of the extension officer and colleagues label you less knowledgeable, then take pride in the fact that you would have scored a good harvest.

Till then, ENJOY!!!

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One of the ways of applying fertilizer in a maize field

A guide to applying fertilisers for maize farmers

MAIZE, also known as corn, is a staple crop grown throughout the country. It is a versatile plant that can adapt to different climates and soil types. However, to achieve the best growth and yield, maize requires proper nutrition, which can be provided through the application of fertilisers. In this blog post, we will provide you with a comprehensive guide on how to apply fertilisers to your maize farm.

- Soil Testing: Soil testing is the first and most important step in fertiliser application for maize. It is critical to test the soil in order to assess its nutrient content. This will assist you in determining which nutrients are deficient and should be supplemented. Soil testing kits are readily available here, and they are easy to use, providing precise data to guide your fertiliser application.
- Determine the Nutrient Requirements of the Plant: After conducting a soil test, which will indicate the lost and deficient nutrients as well as those available, it's essential to determine the plant's nutrient requirements. In the soil, certain nutrients such as NPK (nitrogen, phosphorus, and potassium) play a vital role. These nutrients are of utmost importance as they directly influence the growth, overall development, and yield of the maize plant.
- Nitrogen is essential for photosynthesis and protein synthesis within a maize plant. It plays a central role in trapping light energy during photosynthesis, facilitating the production of carbohydrates, and ultimately promoting plant growth.
- Phosphorus is essential for the transport and storage of energy. It facilitates in the conversion of light energy into chemical energy, hence supporting activities like as DNA and RNA production, while,
- Potassium is also required for water regulation and disease resistance, maintains the maize plant's water balance, supports nutrient transportation, and general cell health.
- Choose the right fertiliser: After you have determined the nutrient requirement and nutrient availability in the soil, choose the fertiliser to use. There are two types of fertilisers available: organic and inorganic.
- Organic fertilisers, such as compost and manure, are less harmful to the environment and improve soil structure. They do, however, release nutrients slowly and may not supply adequate nutrients for a high-yielding maize.
- Inorganic fertilisers, often known as synthetic or chemical fertilisers, are manufactured products designed to supply essential nutrients to plants. They provide nutrients rapidly and in large quantities. They are excellent for repairing nutrient deficiencies, but if not used accurately, they can be harmful to the environment. They are mostly composed of macronutrients (NPK) and micronutrients (boron, iron, copper). Examples of these fertilisers available are urea (boost nitrogen levels), triple superphosphate(addressing), phosphorus deficiencies), potassium chloride (supplying essential nutrients).
- Apply fertiliser at the right time: Timing is crucial in fertiliser application. The best time to apply fertiliser to the maize crop is at planting and during the growing season.
- At planting, apply a starter fertiliser to supply the seedlings with the nutrients they need to build their root systems. Early availability of nutrients promotes early growth and development, thereby, laying a solid foundation for the crop's lifecycle.
- During the growing season, apply additional fertiliser to support growth and yield because as the crop progresses through various growth stages, its nutrient requirements will definitely change. Also, avoid adding fertiliser late in the season because the plant may not be able to use it and it could lead into leaching.
- Method of application: This is also important. Fertilisers can be applied in various ways, including broadcasting, banding, and side-dressing.
- Broadcasting involves uniformly spreading fertiliser across the whole surface of the maize field before planting. This method is used when soil testing indicates a need for widespread nutrient supplementation. The disadvantage of this method for maize growth is there will be nutrient loss due to runoff or leaching.
- Banding involves applying the fertiliser in a band next to the seed at planting. This method provides nutrients directly to the root zone, enhancing nutrient availability during critical early growth stages. It is also done during germination and initial development of the maize crop.
- Side-dressing involves applying the fertilizer next to the growing plants during the growing season. This method delivers nutrients when the maize plant needs them the most, improving nutrient absorption and utilisation. It's especially beneficial for dealing with nutritional deficiencies as the crop matures.

Side dressing method

Please note that the best method for application depends on the type of fertiliser, the nutrient needs of the maize, and the soil conditions. Fertiliser application is not just a task, but an art that requires knowledge, precision, and understanding of your soil and plants. It is a

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Weed management principles for maize

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weed control with cultivation is not possible.

The stubble left on the soil surface can be regarded as a mulch, but it needs to be spread evenly.

Chemical control

A greater reliance on herbicides requires close attention to the types of weeds, weather patterns, cropping systems and soil types. In order to decide what herbicides to use, a few factors need consideration.

a) Weeds present

Various weed characteristics influence the effectiveness of herbicides. Younger plants have more penetrable leaves and usually have a higher metabolism than older plants. It is therefore essential to control weeds as seedlings and not as mature plants. Plants under stress are usually less susceptible to herbicides and weed control will be reduced. If the weeds have narrow leaves or leaves with hairs, thorns or a waxy surface, less herbicide will be absorbed.

b) Registered herbicides

USE ONLY REGISTERED HERBICIDES. Herbicides can broadly be divided into two groups — soil-acting herbicides and foliar-applied herbicides. Soil-acting herbicides are taken up by germinating seeds, while the foliar herbicides will be taken up by the leaves and the stems. The susceptibility of both crops and weeds to herbicides is related to the time of application. It is important to remember to use the chemical at a time when the crop is at its most resistant and the weeds are at their maximum susceptibility.

Timing of applying herbicides can be grouped into four categories:

- **Burndown:** These herbicides control emerged weeds before or just after planting, but prior to crop emergence. The weed species present and their size and life cycle, will determine the dosage rates. This application is important for no-till farmers.
- **Pre-plant:** The herbicides are applied to the soil any time before crop planting and persist in the soil. The main objective is to prevent early weed growth.
- **Pre-emergence:** These herbicides are applied shortly after crop planting but before the weeds emerge. Unfortunately, rain is needed for washing them into the soil and triggering their activity.
- **Post-emergence:** These herbicides are applied after the crop has emerged and are therefore not strongly influenced by the soil environment as they act on the above-ground plant parts.

c) Factors affecting herbicide choice

1. Effects of soil

Organic matter content is of particular importance because it is the main factor controlling adsorption and hence availability in the soil. It also affects microbial activity and has an influence on microbial degradation of herbicides. Herbicides may vary greatly in water solubility and absorptivity to soil colloids. This may explain why some herbicides work well in one situation and poorly in another. Herbicides that are low in water solubility are strongly adsorbed on soil particles, have shortened persistence and are less likely to leach. This also serves, in part, to explain crop injury under heavy rainfall conditions. Soils with high clay content tend to adsorb herbicides more strongly and thus may lead to a decrease in their availability for degradation.

2. Persistence

The length of time in which a herbicide remains active or persists in the soil is extremely important, because it will determine the length of time that weed control can be expected, or the time a chemical is present in the environment. Residual persistence is also important, because it leads to phytotoxic effects that may prove injurious to subsequent crops. This can restrict crop rotation options available and cause environmental contamination. Persistence is dependent on the herbicide, soil and environmental characteristics.

3. Crop Rotation

Crops may be damaged by herbicide residues applied the previous season. Producers need to know the different waiting periods before planting susceptible crops. Crop failure may require a change in crops for specific fields. Some herbicides limit replant options. When an herbicide tank mixture is applied, the most restrictive label must be observed.

4. Tillage practice

In a no-tillage situation, both simple and creeping perennial weeds can increase. Seed burial is reduced and the reservoir of dormant seed serves as a continuous source of weed infestations. Plant residues can intercept soil-applied herbicides and reduce the amount reaching the soil. Herbicides can be degraded by sunlight and may be lost before rain washes them into the soil. Soil-incorporated herbicides such as EPTC cannot be used with no-till because the herbicide needs to be incorporated into the soil.

5. Application equipment

Safe and effective use of herbicides require proper calibration and operation of the application equipment. The selection of the type of equipment depends primarily on the weed history of the field, the crop to be planted, herbicide choice and herbicide formulation. Herbicides, formulated as solutions, emulsions and wettable powders, are usually applied to the soil or plants as sprays, with water as diluent or carrier. Granules are applied by mechanical spreaders similar to those used for fertiliser.

Pre-emergence herbicides are usually applied through a boom attached to the planter.

6. Climatic factors

If rainfall occurs too soon after a post-emergence herbicide was applied, the effectiveness can be reduced. Herbicides vary in their time requirements for rain-free periods after application. The exact time required to protect herbicide activity will vary with target species and environmental conditions.

c) Tank Mixtures

Only registered mixtures should be used. In many instances these consist of herbicides produced by the same manufacturer. On every herbicide label the herbicides recommended for mixtures are displayed. Every time a mixture is made up it is advisable to add the products in the same order and proportion as planned, shake it well and leave it. If any flocculation, coagulation or precipitation occurs, the specific mixture cannot be used.

When mixing chemicals prior to spraying, half fill the spray tank with water and commence agitation. Add the formulations in the order specified on the labels, creaming them first in a little water, and then adding at least 10 percent of the total volume of water before each chemical is added. Summary Weed interference is a given in any crop production situation, leading to potentially high yield losses if seeds are not adequately controlled.

Reliance on chemical control only has drawbacks, such as the development of herbicide resistance, the potential negative impact on food and environmental safety and the failure to control weeds due to adverse climatic conditions or application errors. Therefore, weed management should focus not only on curative methods but instead on combining different cultural methods to prevent and manage weed populations.

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ripe (when the flies start laying their eggs on the fruit). The flies will fly in but will not be able to get out.

Fruit fly trap

Many small wasps feed on pollen and attack pests. Growing flowering plants that make lots of pollen will attract these wasps, and the wasps will protect crops from pests.

Tall trees planted around your field can stop locusts or make them pass over your field. Trees also provide shelter for useful insects.

Ants are fierce predators. If your crops are attacked by grubs, sprinkle sugar water on the stems or harvested tubers. Ants will come for the sugar water and stay to eat the grubs!

Many flying insects lay their eggs on crops. The eggs then hatch into grub and caterpillar pests. Hanging a torch or a lamp above a bucket or lined hole full of water will attract flying insects, which then fall into the water and drown.

This solves the problem before any eggs can be laid or hatched.

Change crop patterns

Crops in the same plant family can get the same pests and diseases. For example, if you always plant potatoes in the same field, potato beetles may come to live and breed in that field. But if every 3 years you plant something they cannot eat, the beetles will leave or die. The third year crop must not be a relative of potato, like tomato or pepper. It should be something completely different, like maize. This is called crop rotation. 2 ways to prevent disease and pests are to rotate crops and to plant a variety of crops together.

Rotate crops

Rotating crops (changing the crops you grow in a particular field) controls diseases and pests by depriving them of food. It will also improve the soil by adding different nutrients. For example, rotating grains in one season with beans in the next will make the soil richer. Grains grow tall and provide organic matter, while beans add nitrogen to the soil.

Plant a variety of crops together

Planting different types of crops provides places for useful insects to live and makes it harder for pests to find the crop they like to eat. Growing many types of crops also improves food security, because if one crop fails, there are others to use. Planting different crops next to each other protects against pests in these ways:

- Some strong smelling herbs and vegetables keep away pests.
- Some flowers attract predators that eat pests.
- Some plants "trap" pests. This is the opposite idea from keeping pests away. If you plant something that pests like better than your crop, they will stay on the "trap plant" and leave your crop alone.

Farmers also combine trees with animals and crops to increase the benefits of each of them.

Adapted from: A community Guide to Environmental Health

Pasture and forages for profitable dairying — (Part 1)

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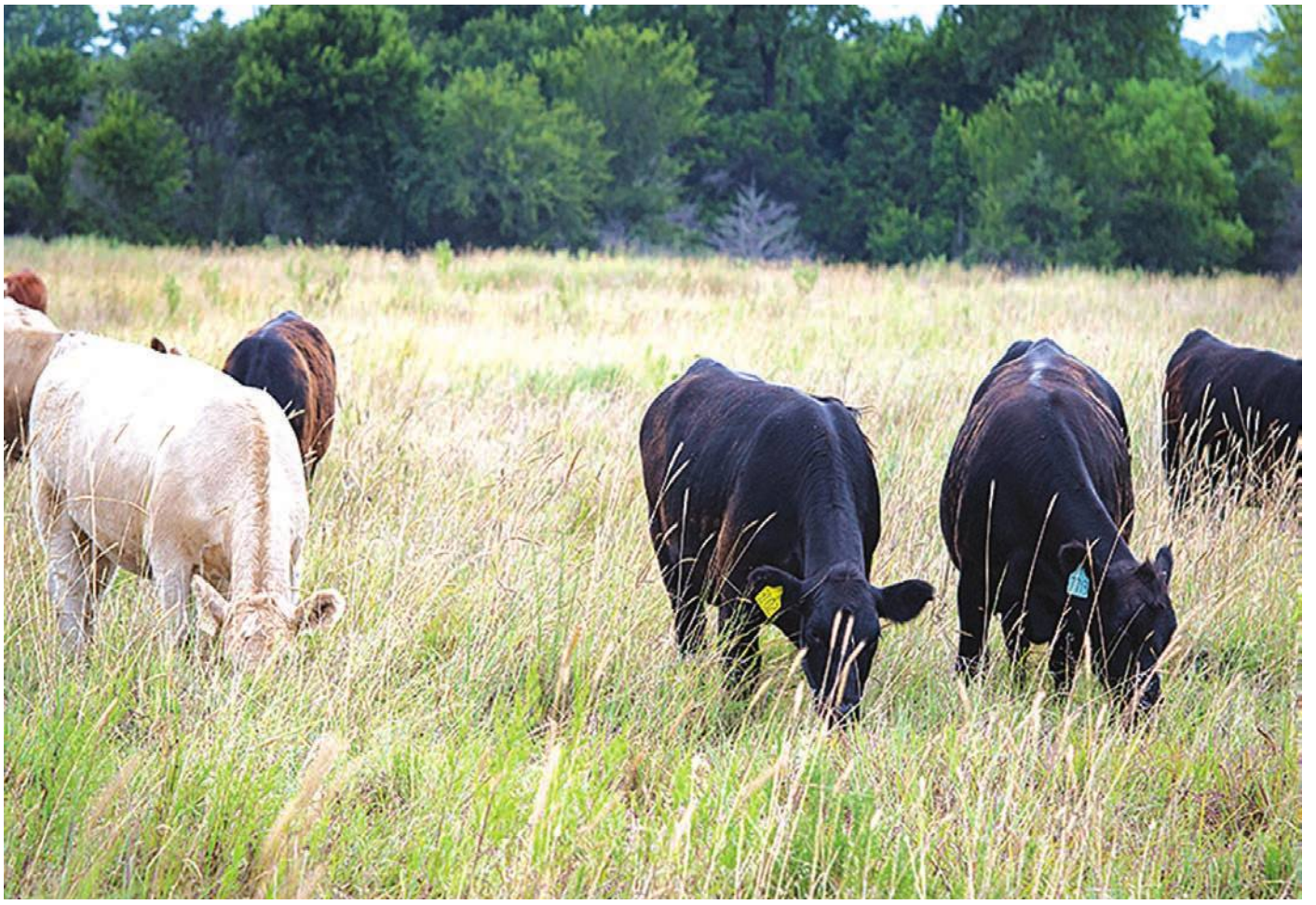
Forage	Diseases and pests	Management options
Brachiaria	Naturally resistant to most pests and diseases except for spittlebugs.	
Bush rye	No pests or diseases of importance.	
Calliandra	Calliandra trees are vulnerable to scales (white powdery insects that attack mature trees on the stems), black ants and termites. Crickets and hoppers will mainly attack young seedlings in the nursery and immediately after transplanting. Armillaria mellea is a fungus that kills plants by attacking the roots.	Scales can be controlled by sprinkling washing detergent (e.g. "Omo") solution. Black ant and termite nests must be dug out and destroyed before they damage the tree. A tobacco and garlic mixture can be used to repel insects (chemical insecticides are not appropriate for trees used to feed livestock). To prevent Armillaria mellea, avoid planting Calliandra in areas which have been recently cleared of trees. Quickly uproot and burn any affected plants and do not replant in affected areas in some years
Cenchrus ciliaris	No diseases or pests of importance	
Desmodium	Common pests are aphids and the Amnemus weevil. If aphids are not controlled, they may transmit a viral disease known as little-leaf. A fungal disease, anthracnose, can affect Desmodium especially in poorly drained soil.	Aphids and weevils can be controlled by use of insecticides (be careful to strictly observe use and safety instructions on the pack). Anthracnose can be avoided by properly draining soil.
Lablab purpureus	The psyllid insect (Heteropsylla cubenseis) is the most important pest and it can wipe out the entire crop, especially of the species L. leucocephala. Damping-off is an important fungal disease affecting seedlings in the nursery.	Psyllids can be controlled by planting resistant species such as L. diversifolia or by introducing beetles and parasitic wasps. Damping-off can be controlled by avoiding excess watering and using free-draining soil.
Velvet bean	Velvet bean faces few problems with insect pests, likely due to toxic compounds although slugs and snails may be damaging in rainy climates.	
Cowpeas	Cowpeas are vulnerable to serious insect damage from sowing until about four weeks after seedling emergence. Establishing crops are often damaged by cutworm, bean fly, wireworm and cowpea aphid, or by cutworm, wireworm, grass blue butterfly, lesser armyworm and heliothis caterpillar. In inland areas, cowpea crops appear more sensitive to attack by black cowpea aphid than does lablab	Control using conventional and non-conventional pest control methods
Love grass	No diseases or pests of importance.	
Lucerne	The psyllid insect (Heteropsylla cubenseis) is the most important pest and it can wipe out the entire crop, especially of the species L. leucocephala. Damping-off is an important fungal disease affecting seedlings in the nursery.	Psyllids can be controlled by planting resistant species such as L. diversifolia or by introducing beetles and parasitic wasps. Damping-off can be controlled by avoiding excess watering and using free-draining soil.
Lucerne	Susceptible to numerous pests and diseases which can cause damage at any stage of growth. Some important pests include Lucerne weevil, caterpillars, cutworms/army worms, aphids and leafhoppers. Some important diseases are bacterial leaf spot, common leaf spot, downy mildew, stem blight andmany others.	Pests can be controlled by natural predators or chemical insecticides. Both disease and pests can be avoided by maintaining a healthy stand, crop rotation and planting resistant varieties.
Napier grass	Napier is relatively free of pests and diseases but it is susceptible to Napier headsmut in some regions.	Control by removing and avoiding infected material and planting resistant varieties, such as Kakamega 1.
Oats	Oats are prone to Yellow Dwarf Virus or Redleaf, Leaf or Crown Rust, Septoria Leaf Spot, Stem Rust, Halo Blight, Loose Smut and Covered Smut.	Seed may require to be dressed depending on local disease patterns.
Rhodes grass	No diseases of importance but common pests such as army worms may attack the pastures.	
Rye grass	Rye grass is vulnerable to insects, fungi, rusts and molds.	
Sweet potato (dual-purpose)	Has numerous pests including stemborers, weevils, worms and butterflies. Vulnerable to various forms of stem and root rot.	Avoid planting infested material, quickly remove infested plants. If you encounter problems with pests and disease, plant early and harvest quickly to reduce exposure. Frequently earth up around the plant to avoid pests that feed on the root. Most pests that feed on the leaves do not require control, though careful application of pesticides and hand-picking can be used when necessary.

Watch for signs of Blackleg and Anthrax after floodwaters recede

BLACKLEG and anthrax in cattle can occur in dry weather after floodwaters recede. Floodwaters disturb the soil, which can expose the spores that trigger the diseases. The floodwaters then can carry the spores into areas where cattle graze.



Cattle producers who experience the sudden death of their livestock after floodwaters recede should contact their veterinarian to attain a diagnosis. If anthrax is suspected, producers must immediately notify the nearest veterinary office.

Anthrax is characterised by high fever, anorexia, abdominal pain, bloody urine or bloody diarrhoea. This is typically followed by severe depression, respiratory distress, muscle tremors and convulsions in affected animals. Cattle of any age can contract the disease.

In the event of death, animal carcasses tend to decompose rapidly, an issue with both diseases. Blood may exude from the mouth, nose and anus. Lymph nodes may be swollen with anthrax. The large muscles of the shoulder and hind leg will be swollen with blackleg. The onset of blackleg typically occurs in livestock between six months and two years of age. Animals more than two years of age rarely contract the disease.

Clinical signs of blackleg are rarely seen by livestock operators, with most producers simply finding dead animals. The few animals found alive often show signs of depression, lameness, swelling of an infected area, fever, pain and crepitus under the skin, which will feel and sound much like bubble wrap when palpitated.

Blackleg is caused by Clostridium chauvoei. Anthrax is an infection caused by Bacillus anthracis. Both bacteria are found worldwide, and the diseases they cause tend to be acute and highly fatal. The bacteria primarily gain access to an animal's body through ingestion, especially if the grass becomes short due to overgrazing or dry conditions. To a lesser extent, both organisms may contaminate an open wound, and anthrax organisms may be inhaled.

Blackleg typically is associated with cattle, but the disease can occur in other ruminants as well. Anthrax occurs mostly in ruminants but can occur in other animals, including humans.

Livestock producers must avoid opening carcasses suspected of having blackleg or anthrax. First, it may allow spore formation to contaminate the soil in the area. Second, humans can contract anthrax so it is not worth the risk. Treatment of blackleg is typically unrewarding; however, if an animal suffering from the disease is found to be alive, it can be administered large doses of antibiotics and supportive care. By contrast, anthrax is susceptible to many antibiotics if caught early enough.

Producers should consult with their veterinarian in regards to proper antibiotic selection. It is vitally important livestock carcasses be dealt with properly to reduce the chance of soil contamination and spore formation. Deep burial of the carcass typically is necessary.

The best prevention strategy against blackleg is to vaccinate. Calves should be vaccinated between 60 and 90 days of age, followed by a second vaccination in four to six weeks. Producers may only vaccinate for anthrax if approved by the Department of Veterinary Services (DVS).

Oklahoma State University Extension

A guide to applying fertilisers for maize farmers

• **From Page 4**

game changer in the farming world, capable of converting barren lands into abundant harvests. But keep in mind that, the secret is not just in how you apply it, but also in what you apply.

That is why we invite you to explore our marketplace. We offer a wide range of top-tier fertilisers that are tailored to your farming needs. Our products are more than simply fertilisers; they are your partners in growth ensuring that your crops get the nutrients they need when they need them. So, why wait? Visit Crop2Cash Marketplace now, because your crops deserve the best!

The right time to apply fertiliser to maize depends on the type of fertiliser and the stage of growth:

• Basal dressing

Apply before or during planting, or within a week of germination. You can apply it in a band below and to the side of the seed, or cup it into the planting hole.

• Top dressing

Apply 3–6 weeks after the crop emerges. You can use urea or CAN for top dressing. In sandy or sandy loam soils, you may need to split the top dressing into two applications.

• Nitrogen

Apply nitrogen in stages, with 20–50 units at sowing and the rest when the plant has 7–8 leaves. Maize absorbs little nitrogen during its first month of growth.

You can consult your agricultural advisor for fertilizers recommended for your area.

Here are some other tips for fertilising maize:

- Add manure and ash to improve the maize's response to fertilizer.
- Apply lime to acidic soils to improve the response to fertilizer.
- Reduce fertiliser rates after a drought, or if you're applying manure or ash, or if the maize is following a well-fertilised crop.
- In irregular or rainy seasons, you can apply urea in three stages: 1/4 at planting, 1/2 at knee height, and 1/4 at a split application.

Integrated management of fall armyworm


Fall Armyworm

FALL Armyworm (FAW) (Spodoptera frugiperda) is a polyphagous and highly destructive insect pest that feeds on numerous crops and survives and feeds on different plant species, including maize (Zea maysL.), wheat (Triticum aestivum L.), sorghum [Sorghum bicolor L.) Moench] and rice (Oryza sativa L.). Maize, a cereal and a staple food crop in Zimbabwe, is one of the crops that the FAW attacks and heavily feeds on (Harrison et al., 2019; Prasanna et al., 2018; Day et al., 2017).

The incidence of FAW in Zimbabwe was first reported in Bubi district in Matabeleland North province in September 2016 (FAO, 2020). FAW infestations were then reported across the country during the 2017-18 cropping season. The rapid spread of this pest is aided by its high reproductive rate and migration ability, wide host range and adaptability to different environments. Most farmers in Zimbabwe who failed to implement FAW control measures have incurred yield losses of up to 58% and 50% household income loss due to FAW infestations and damage, resulting in household food insecurity and loss of household income (Tambo et al.,2021; Baudron et al., 2019).

The life cycle of the FAW which consists of four stages: eggs, larva, pupa, and adult is completed in about 24 — 40 days during warm temperatures but may extend to 60 — 90 days in cooler temperatures. Adult females lay eggs in clusters on the under and upper sides of plant leaves. Each adult female can lay about 1000-1500 eggs during its reproductive stage (7 to 21 days). The female normally lays most of her eggs during the first four to five days of adult life, but egg-laying can continue for up to three weeks. Eggs hatch into small larvae within 3 to 5 days. Small larvae may appear greenish, while bigger larvae vary in colour from orange to green and black or brown. The FAW larvae mature within 14 to 21 days (2 to 3 weeks), and up to 5 to 6 overlapping generations may hatch in a year. The larval stage of the FAW is the most destructive phase when they heavily feed on vegetative and reproductive parts of plants. FAW adults can migrate for 100 km in one night, and fly more than 500 km in one generation, thereby resulting in the rapid distribution of the pest across regions within a short period.

The Scientific and Industrial Research Development Centre (SIRDC), in collaboration with Extension and Advisory Services institutions under the Ministry of Lands, Agriculture, Fisheries, Water and Rural Development is implementing a project on Sustainable Integrated Management of the FAW.

The project is funded and supported by the Rural Development Administration (RDA) of Korea under the Korea-Africa Food and Agriculture Cooperation Initiative (KAFACI).

The research project seeks to develop and scale up effective, sustainable and environmentally friendly integrated FAW management technologies leveraging on cultural and biological controls, as part of an Integrated Pest Management (IPM) strategy.

The on-farm research trials for assessing and evaluating the efficacy and effectiveness of different methods for controlling FAW in maize were successfully conducted in Hwedza, Buhera, Masvingo, Chiredzi and Chisumbanje. The methods evaluated: (i) the use of locally available plant-based bio-pesticides (Neem Leaf Extract and Lantana Camara Leaf Extract), (ii) intercropping maize with legume crops (sugar beans, cowpeas, groundnuts) and (iii) the use of pheromone traps. These methods have proved to be very effective in controlling the FAW under smallholder farming systems as indicated by a 30% to 50 % increase in yield as compared to untreated maize. The continuous use of chemical insecticides by farmers for controlling FAW results in the development of insect resistance, increased risk to human health, harmful effects on non-target organisms and risk to the environment. In addition, most farmers have little or no access and some cannot afford to purchase chemical insecticides for controlling the FAW. Farmers are therefore recommended to (i) regularly scout for the pest in their fields, (ii) apply control measures early, and (ii) adopt and practice low-cost sustainable methods for FAW management.

The pheromone traps produce a scent that attracts the adult male FAWs which are then captured. The traps act as a control measure through the disruption of mating of female and male adults, hence reducing the FAW population over time.

The traps are also a tool for monitoring the population of FAW within an area or region over a period of time. Pheromone traps are installed in the field soon after planting and they provide early warning data on insect incidence, abundance, and distribution within an area.

They assist farmers in making early informed decisions on preventing and controlling the pests. Farmers have shown a lot of interest in using pheromone traps in their fields. However, the unavailability and high costs of pheromones are a huge concern for the resource poor smallholder farmers in Zimbabwe.

SIRDC and the Extension and Advisory Services Department of the Ministry of have trained and educated more than 200 farmers on climate-smart pest management technologies through a participatory learning approach. The on-farm trials and training of farmers were conducted across agro-ecological regions of Zimbabwe including, Chigondo, Murambinda, Mushandike and Rupangwana Irrigation Schemes in Hwedza, Masvingo and Chiredzi, respectively. Through coordinated efforts in research and extension services, the effects of this invasive and destructive pest can be minimized thereby safeguarding the food security of Zimbabwe and potentially the region at large. These long-term research-based solutions will ultimately reduce the impact of FAW thereby contributing to sustainable food security in Zimbabwe.

Compiled by SCIENTIFIC & INDUSTRIAL RESEARCH AND DEVELOPMENT CENTRE

For more Information, Contact,

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Unlocking the Secrets of Paprika Farming

Common name: Paprika

Scientific name: Capsicum annuum Shona: Mhiripiri Ndebele:

Background

Paprika is a spice crop.

Varieties

- Papri-King and Papri-Queen.

Climatic and Soil Requirements

- Well-drained fertile soils with a pH range of 5.5-7.5.
- Crop very sensitive to water-logging.
- Sandy loam and clay loam soils with good drainage and aeration. Usually planted on ridges.
- Sensitive to frost.
- Optimum growth occurs at 24-30 Degrees Celsius, poor growth occurs when temperatures are between 4-15 degrees Celsius. Day temperatures above 32 degrees Celsius and night temperatures below 16 degrees Celsius prevent fruit set.
- Low humidity and high temperatures cause abscission of buds, flowers and small fruit.

Planting

- Seed rate: 700 g/ha.
- Sowing of seedbeds must not begin before 1 June.
- Seedbed area: 4 beds measuring 29 m long x 1.2 m wide each, giving an area of 34.8 m^2 each, will provide adequate seedlings to plant a hectare.
- Seedling spacing: 5-10 cm between the rows and 2-3 cm within the rows.
- Transplanting in the field must not be done before 1 September and must be completed by 1 January, when seedlings are 15-20 cm high or pencil thickness, 6-8 weeks after sowing.
- Transplanting in September-October give best yields.
- Seedlings should be hardened before transplanting.
- Field Spacing: 90 cm between the rows, 20 cm within the row.
- Paprika is grown in one row on raised ridges or in two rows on raised beds.
- Plant population is 55 000-65 000 plants/ha.
- Growth period: 7 months.

Fertilisers Requirements

Fertiliser	Rate/ha	Timing
Compound S or L	700-1000kg	Before planting
Ammoniun Nitrate	250-350kg	Split application 4,8,12,16,20 weeks after transplanting
Muriate of Potash	400kg	Split application 4,8 weeks after transplanting

Harvesting

- When the pods turn dark red and wrinkled, so that it can be wrapped around the two fingers without snapping, the pods are ready for harvest.

Yield Levels

- Yields of dry pods are 2.8-5.6 tons/ha.

Marketing

- Local buyers or processors.

Source: Ministry of Lands, Agriculture, Fisheries, Water and Rural Development; Field and Horticulture Crops Handbook for Farmers

Pests Control

Pest	Damage	Control
Cutworms	Plants chewed through stems near the soil line.	• Pyrinex 48 EC, Mix 200ml/100lt water and drench with 30 cup per plant
Bollworm	Fruit damage, deep watery cavity contaminated with faeces and cast skin.	• Lambda - Cyhalothrin (karate, Icon 10 WP, knockout, Lambda — Cyhalothrin) • Thionex 35 EC, Apply 190 ml / 100 lt water. • Repeat 7-10 days if necessary • Dedevap 1000, Apply 100 ml / 100 lt water as full cover sprays
Budworm	Unripe fruit is preferred.	• Lambda - Cyhalothrin (karate, Icon 10 WP, knockout, Lambda — Cyhalothrin) • Thionex 35 EC, Apply 190 ml / 100 lt water. Repeat 7-10 days if necessary • Dedevap 1000, Apply 100 ml / 100 lt water as full cover sprays
Fruitworm		• Lambda - Cyhalothrin (karate, Icon 10 WP, knockout, Lambda - Cyhalothrin) • Thionex 35 EC, Apply 190 ml / 100 lt water. Repeat 7-10 days if necessary • Dedevap 1000, Apply 100 ml / 100 lt water as full cover sprays
Aphids	Stunted plants; distortion and mottling of younger leaves, which become cupped.	• Demeton-s-methyl (Metasystox 25 EC), • Apply at least 3 sprays at 100 ml/100 lt water every 14 days
Red spider Mites	Curled leaves giving an inverted spoon appearance.	• Demeton-s-methyl (Metasystox) Apply at least 3 sprays at 100 ml/100 lt water every 14 days. • Pyrinex* Mix 1lt with 500 lt water and drench with 30 cup/plant • Kelthane*/Dicofolm 68ml/15lt water for RSM
Nematodes	Problems in seedbeds	• EDB 92 EC*, Dilute 1:3, and apply 600 ml/ 100 m row before planting. • EDB Tech*, Apply 125 ml/100 m row. • Nemacur 40 EC*, Apply in 250 lt mix/Ha after transplanting.

Diseases Control

Damping Off	Rotting and wilting of seedlings	Copper Oxychloride
Late Blight	Dark brown stem necrosis extending upwards from the soil. Sudden wilting.	• Copper Oxychloride
Bacterial wilt	Wilting of lower and upper leaves in young plants. Sudden wilting of the entire plant.	• Observe hygiene and spray Copper Oxychloride • Kocide 101* Apply in mixture with Mancozeb at 800 g/Ha
Fusarium wilt	Slight yellowing of foliage and wilting of upper leaves.	• Polysulphides sulphur (Lime Sulphur)
Bacterial Spot	• Circular, water-soaked leaf lesions that becomes necrotic with brown centres. • Defoliation is common. Raised brown lesions that are wart-like in appearance on fruit.	Observe rotations and apply Copper Oxychloride Kocide 101* Apply in mixture with Mancozeb at 800 g/Ha
Verticillium wilt	Wilting and upward curling of lower leaves as well as a stunted plant growth.	• Polysulphides sulphur (Lime Sulphur)
Blossom end rot	Water-soaked areas, which later turn brownblack. These develop near the blossom end and never at the tip of the pod.	• Apply 3kg/ha for Blossom End Rot 1.5kg/15lts water) and good water management

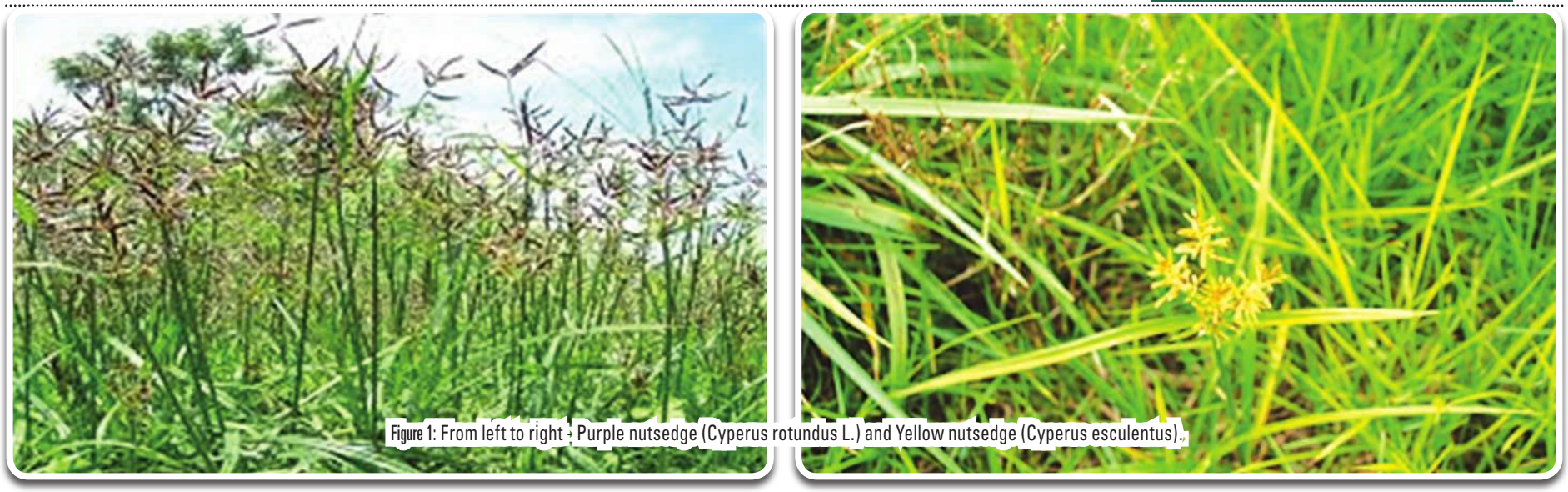


Figure 1: From left to right - Purple nutsedge (Cyperus rotundus L.) and Yellow nutsedge (Cyperus esculentus).

Nutsedge Weeds Management: Key Strategies for Tobacco Farmers

Fungai Zinyandu, Tendai Hove, Kumbirai Mateva

Effective weed management is crucial during the vegetative and expansion stages of a tobacco crop, as competition for nutrients, can lead to significant yield reductions. Two species of nutsedge, Cyperus esculentus L. (yellow nutsedge) and Cyperus rotundas (purple nutsedge), are particularly problematic in both irrigated or rainfed tobacco cropping systems (Fig 1). These weeds thrive in various environments and can severely impact crop productivity if not managed properly.

Characteristics of Nutsedge Weeds

Nutsedge weeds are highly adaptable, thriving in diverse environmental conditions, and possess multiple modes of reproduction, including rhizomes, true seeds and tubers. This reproductive versatility makes nutsedge control extremely challenging. One nutsedge tuber can produce between 1 900 and 2 000 plants and generate approximately 6 000 to 6 900 tubers in a single growing season. These tubers can persist in the soil for extended periods, remaining dormant and contributing to the weed's notorious persistence over several seasons.

When nutsedge plants experience mechanical or environmental stress, they redirect resources towards their storage organs (tubers), enabling them to survive adverse conditions. This response underscores the importance of timely and effective management, as improper control can exacerbate the problem by encouraging the proliferation of these storage structures. Both mechanical and chemical control measures must be employed to suppress the spread of nutsedge and mitigate its impact on tobacco production.

Mechanical Control

Mechanical methods of nutsedge control are often used as an initial measure to reduce weed populations. These methods include ploughing, disking, mowing, hand-hoeing and cultivation. By exposing the tubers and rhizomes to the sun, these measures encourage desiccation and help weaken the weeds reproductive structures

- Hand- hoeing is the most common method in tobacco fields, where workers manually remove weeds from within the rows (intra-row) and between the rows (inter-row).
- Mowing is another important technique, as it prevents seed production, thereby reducing the weed seed bank in the soil. Additionally, mowing helps deplete food reserves in the rhizomes and tubers, further weakening the weeds ability to spread.

Chemical Control: Herbicides, Application Methods And Timing

Herbicide use is essential for controlling nutsedge weeds, especially due to their ability to target the weeds reproductive organs and offer long-term control solutions. The effectiveness of chemical herbicides depends on proper application timing, herbicide type, and coverage.

Pre-emergence Herbicides

Pre-emergence herbicides are applied to prevent weed seed germination and should be used before the weeds emerge (Fig 2). In tobacco production, these herbicides are typically applied within four days of transplanting the crop. Adequate soil moisture, often achieved through "settling-in" irrigation, is necessary to activate the herbicides. This moisture helps form a herbicide seal at a depth of 1-5cm from the soil surface, inhibiting weed seed germination.

- Common pre-emergence herbicides for nutsedge control include S-Metolachlor, Sulfentrazone and Dimethenamid-P.

Post-emergence Herbicides

Post-emergence herbicides are applied after the weeds have emerged (Fig 2), ideally when the weeds are still in the seedling stage (2-3 leaves). Maximum herbicide coverage is essential for effective results. Surfactants cab be used alongside post-emergence herbicides to enhance weed control. It is recommended to apply these herbicides after irrigation or rainfall, which helps facilitate the herbicides absorption and effectiveness.

- Recommended post-emergence herbicides for nutsedge control in tobacco fields include Halosulfuron and Bentazon.

Herbicide Application Notes

Herbicides can be phytotoxic to tobacco plants if not applied correctly. Therefore, it is important to follow proper application techniques to avoid damaging the crop. Key considerations include selecting the right nozzle, using the correct application rate, and spraying at the appropriate time.

- Flat-fan nozzle are recommended for applying herbicides, as they deliver a fan-shaped spray pattern, providing uniform coverage between ridges.
- Flood-jet nozzles may also be sued for post-emergence herbicide applications.
- Safety precautions must always be followed when handling herbicides. Protective clothing is essential to prevent exposure, and environmental safety should be considered to minimise the risk of contamination.

Conclusion

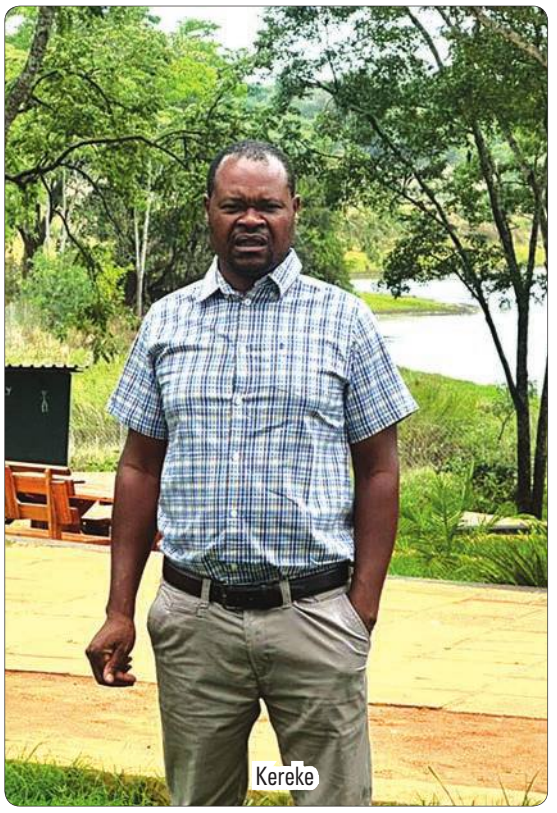
Achieving optimal tobacco yields requires best management practices, including timely and effective weed control. Proper nutsedge management, through a combination of mechanical and chemical strategies, is essential to prevent yield losses and ensure the sustainable production of tobacco. For further guidance, please contact Kutsaga Research Station's Sustainable Agricultural Practices (SAP) division via the following communication channels:

- ***VOIP: 0868 800 2604***
- ***WhatsApp: 0714 980 980***
- ***Email: kutsaga@kutsaga.co.zw***

Figure 2: From left to right – application of a pre-emergence herbicide following tobacco transplanting, and application of a post-emergence herbicide in a tobacco field heavily infested with weeds.

'I'm switching to a 150KVA solar-powered irrigation system next season!'

Daniel Chigumwe



Kereke

Kereke explains tobacco farming during a field tour

TOUTED as the national breadbasket of Zimbabwe, Mashonaland Central province weaves captivating agricultural narratives year after year, with its farmers, mostly beneficiaries of Government's land reform programme crafting remarkable stories in the fields, cementing its reputation as a hub of agricultural excellence.

And despite the clear and present danger the current climate change problems are causing to agriculture, the province's passionate farmers continue to explore new ways and technological innovations to enhance yields and improve food security.

Here is the story of a 40-year-old Mvurwi farmer, Vitalis Kereke of Farm 19 Umvukwe North who is making waves, breaking new grounds in the agricultural narratives of Mashonaland Central through the judicious exploitation of new farming technology and the agro-tourism subdivision of farming.

With every fresh farming season, Kereke is getting challenged to explore new farming methods with a view to take yields to a higher rung than the previous one for his wide cropping options that include wheat, maize, potato and cabbage.

At a recent field day at Usaka Estate in Mvurwi, Mashonaland Central Minister of State for Provincial Affairs and Devolution Retired Captain Christopher Magomo commended Kereke for being the farmer with the earliest wheat crop to be harvested and for also being instrumental in the province's surpassing of its set wheat target and food security objectives.

Kereke had 90 hectares of the cereal this season. The soft-spoken farmer has always been in the thick of the province and nation's food security matrix and foreign currency generation initiatives. At the moment he has 200ha of commercial maize, 80 ha of irrigated tobacco and 15 ha of potato seed. The man even has a bigger vision of boosting his irrigation prowess by adopting solar-powered irrigation systems to counter the problem of load shedding.

In an interview with the Agriculture Journal recently, Kereke revealed that he is targeting to plant 250ha hectares of wheat in the 2025 winter season after managing to secure solar-powered irrigation systems, as a way of mitigating power challenges.

"To me, agriculture is a practical business with results and solutions for every step, therefore after a successful 2024 winter wheat season, I realised that the only limitation we had was to do with power disruptions. This stopped us from excelling to even higher levels.

"Nevertheless, we came up with solutions on how best we can increase our hectarage next season and we going to do that through introducing the 150KVA solar-powered irrigation pump system," he said.

Kereke's dream is to have a 150KVA solar system for every 100ha and is going to do that for every field he will be using. He currently rents most of the land he uses. In five years' time, Kereke plans to have at least 500ha of land under solar-powered irrigation systems.

With only 100h of arable land at his farm, his passion for farming business has driven him into many a joint venture, which has seen him putting a total of 600ha under cultivation and creating many employment opportunities for surrounding communities.

"At peak periods we engage about 400 casual works in our fields and with Mvurwi being a farming community, our farming activities are opening up new job opportunities especially for the youth and women in the area.

"We are involved in about five joint ventures with surrounding farms and the people drawn from those farms form the nucleus of our day to day labour force. Many of them are experienced farm workers, which guarantees us quality work while in turn we make sure their livelihoods are improved from the earnings we offer them," explained Kereke.

Kereke in his wheat field

In the spirit of diversified farming, Kereke runs a lucrative animal husbandry project where he boasts a drove of more than 1 000 pigs, a herd of 170 cattle, rabbits and road runner chickens.

This is fast growing into a large business enterprise in which he feeds the local butcheries with fresh meat in a move that resonates with Government's growing calls for farmers to treat their activities as serious businesses while also value adding their produce.

"For the past two years we have been central in the processing and distribution of farm fresh meats from our livestock production activities. We run one of the largest piggery projects in Mvurwi and we supply pork to many butcheries. This is the same with the beef, which we produce from our cattle. Of late we have embraced rabbit rearing and we also keep road runner chickens, which we are basically producing for our traditional cuisine in our restaurants," Kereke added.

It is astounding to note how the farmer has transformed so many juicy farming ideas from being mere blueprints into serious projects especially after successfully embracing and launching one of the inspiring agro-tourism ventures in the farming town of Mvurwi.

With a large expanse of land rendered unusable by rocks and indigenous trees at his farm, the farmer-cum-business man has gone on to establish one of the most breath-taking agro-resort centres located in the banks of Gulliver Dam near his farm

Stone and Water Resort is an excellent model of agro-tourism where Kereke has managed to create an ultimate market for his farm produce positively impacting on eating lifestyles of the immediate communities and beyond.

"Only 100ha of our farm is arable so we found a niche market in the remaining area where we created one of the best resorts in town that plays host to many farmers from around here. They come to do boat cruising, quad biking and enjoy the natural environment created by the lodges situated in the bush.

"We also realised the need to promote gastronomy tourism, hence 90 percent of the culinary we are serving is meant to promote healthy lifestyles. We produce the farm products we serve there," Kereke further revealed.

And to add icing sugar to his agro-tourism cake, Kereke recently held a ground breaking ceremony for the establishment of a state-of-the-art foot golf stadium, which will help promote sports and domestic tourism in the town of Mvurwi.

"Sport is a health requirement after a long day of field work, hence in our complex agriculture life, we recently collaborated with Zimbabwe Foot Golf Association for the construction of the state-of-the-art stadium at our Stone and Water Resort.

"Our Minister of State, Retired Captain Magomo, who is also a veteran farmer was here last week for the ground breaking ceremony of the stadium. We realised that we need all the niceties of life to make farming a great and lucrative game," said Kereke.

The story of Kereke remains inspiring especially given that his farm is also fast becoming the centre of agriculture discourse by various stakeholders who hold meetings, field days and workshops.

Planning Barn Space Requirements

1.0 Introduction

The 2024-25 season is forecasted to be a La Nina season meaning that normal to above normal rains are expected. The irrigated crop has established very well across all the tobacco growing regions while planting is in progress for the dry-land crop and, it is imperative that growers properly and timely plan for their curing needs well in advance. Several factors ought to be considered when planning barn space and these include nature of the season, variety ripening rate, number and size of barns, barn curing capacity (number of curing racks, tier spacing and accessibility, air circulation and drying efficiency) among others. This Dear Grower will focus on giving the grower pertinent information on barn space requirements, barn capacity computations as well as proffer recommendations based on both the small- and the large-scale tobacco growers.

1.1 Varietal Growth and ripening rate

The variety growth and ripening rate is important in planning barn space requirements due to the fact that some varieties ripen much faster than others. It is important for growers to appreciate that fast ripening varieties will require adequate barn space to avoid field losses due to flash ripening. For growers doing a double cropping system, careful considerations are required in planning for barn space to avoid varieties clashing for barn space at ripening. As a general rule, where double cropping is preferred, the fast ripening variety should be selected as the irrigated crop while the slow ripening variety is chosen as a dryland crop.

Table 1 shows classification of varieties by their ripening rates:

Table 1: Variety and growth rate

Growth Rate	Variety
Very slow ripening	K RK28; K RK29
Slow ripening	K RK60; K RK61; K RK62; K RK64; K RK66; K RK71; K RK72; K RK74; K RK75 & K RK76
Fast ripening	KM10; K RK8; K RK22; K RK26R; K RK70; K RK73
Very fast ripening	K RK23; T78; T79; T80 & T81

NB: An exhaustive list of varieties and their attributes is available from Kutsaga and its website

Planting a larger area than your barns can handle can result in huge financial losses due to tobacco rotting in the lands. Plan your barn capacity for the peak harvesting time, that is when you have your best leaf anyway, and you cannot afford to lose these leaves.

2.0 The number and size of barns

The total number of barns required depends on how the turn- around time compares to the reaping interval. Turn-around time is defined as the number of days from when a barn is filled until it is ready to be filled again and on average is often 8 days (Curing plus 1 day to empty and refill). The reaping interval is the number of days from one reaping to the next in the same field. The total number of barns required for a given crop may be considered by first calculating the barns needed per hectare using the formula below and multiplying by the number of hectares:

$$\text{Barns per hectare} = \frac{(p \times n \times t)}{(s \times l \times r)}$$

Where, p = plants/ha,
n = no. of leaves/plant/reaping;
t = barn turn-around time in days;
s = no. of clips/barn;
l = no. of leaves/clip and
r = reaping intervals, days.

2.1 Computing the number of barns required per hectare

For the small-scale grower who reaps and fills a barn in a day, an extra barn may be required just to safeguard from field loses caused by flash ripening. However, when crops are well fertilized and leaching adjustments are made during the growing season, the danger of flash ripening are well minimized.

Example

Suppose a grower intends to plant 1 ha and reap it all in a day. How many barns will be needed and of what size?

Assuming a plant population of 15 000/ha, 2 leaves/plant/reaping, 85 leaves/string; there will be about 350 strings/reaping.

Therefore, barns that will hold this amount or slightly more are desirable. Using Table 2 that represents barns per hectare for a 10-day-turn-around-time, the number of barns required per hectare of tobacco grown for a range of barn sizes can be determined. A single 5 m x 5 m x 5 tiers barn could be used; however, this will accommodate one reaping. Therefore, as a precaution, an extra barn may be required particularly where a fast ripening variety like K RK26R has been planted.

Growers are advised to fill a barn in one day to promote uniform colouring and curing, and subsequently reduce the number of bad grades at grading. In cases of continuous curing systems such as tunnels and Chongololos, a constant daily reaping schedule is easier to follow as detailed by the facility manufacturer. However, a similar, equation as detailed above can still be used as a guideline to compute barn capacity.

Growers should also note that the barn turn-around time depends on leaf position, and as a general rule, lower leaves cure over a shorter period than the upper leaves, mainly due to differences in leaf thickness, width and length.

Growers are also advised to choose varieties with leaves that will fit the tier vertical spacing in their barns, or, they will have to adjust vertical tier spacing to suit varieties of choice; for example, K RK76 produces long leaves and will therefore require a larger vertical tier spacing. Failure to adjust vertical tier spacing may lead to a lot of sponge grades of cured leaf, as leaves over-lap from the top tier into the lower one causing over-packing. This is more-so for barns without a forced-air curing system. For forced-air system barns, the effects of over-packing may be entirely eradicated depending on barn type.

3.0 Recommendations

Growers are advised to have the requisite barn space for a given crop size.

In making a varietal choice, it should be noted that, slow growing varieties also ripen slowly and fast-growing varieties also ripen fast, an important implication in barn space requirements. Therefore, a fast ripening variety (e.g. K RK26R) grown in a fast-growing area (e.g. Hurungwe) may require more barn space than when the same variety is grown in a slow ripening area (e.g. Marondera). This is due to a reduced reaping interval for the variety in a fast ripening area.

Failure to cure leaf tobacco right can lead to big loses for well grown tobacco. It's a game of "yield and quality".

For more information, please consult/visit the Agricultural Engineering and Bioinformatics Division; Kutsaga Research Station Telephone# 2638688002604, 071 or toll free, 08004511 or WhatsApp # 0714980980 and Email: kutsaga@kutsaga.co.zw.

Pasture and forages for profitable dairying – (Part 1)

Dr Edson Chifamba

The cost of feeding dairy animals

In my previous articles, I discussed how dairy cows need to consume large amounts of nutritious feed in order to produce high yields of high-quality milk. Unfortunately, providing nutritious feed for dairy cows can be very expensive. Dairy feed is the second-highest cost for most dairy farmers, after the cost of purchasing cattle. On average dairy feed constitutes 76% of total variable costs of dairying. High feed costs make it difficult for dairy farmers to earn a profit from selling milk. To earn a livelihood, farmers must sell enough milk at a high enough price to pay for their cattle, feed and other expenses and still have extra money to keep for themselves. The more money a farmer spends on feed, the more money they need to receive from milk sales in order to earn the same income.

To increase their income, farmers must do one or more of the following:

- Sell more milk,
- Obtain a higher price per litre of milk (usually by producing higher-quality milk), or,
- Reduce their costs for cattle, feed and other expenses.

Different farmers approach this challenge in different ways.

"Maximum production" approach

Some farmers focus on producing as much high-quality milk as possible, and buy large amounts of feed and concentrates at market to help their cows receive as much nutrition as possible. This strategy can be effective if the price of milk is high enough to pay for the extra costs. However, if the price of milk is too low, the farmer might not be able to earn enough money to pay for their expenses.

"Least cost" approach

Other farmers take a "least-cost" approach and let their cows feed on naturally occurring pasture, weeds, cereal crop residues or anything else that is available for free. While this approach costs less than buying feed at the market, naturally occurring pasture is not always plentiful and usually not very nutritious. Still, if a farmer can keep their costs low enough, they will not need to sell much milk to pay their expenses and earn a profit.

"Finding a profitable balance" approach

Most farmers try to find a balance between increasing milk production and reducing costs, and might change their approach from year to year. Even so, when a farmer is forced to choose between higher yields and lower costs, most will favour one approach over the other.

1. Pasture and crop choices

One cost-effective approach for feeding dairy cattle is growing forage crops on your farm. Farmers who grow their own forages can supply dairy cattle with nutritious feed for much less than it would cost to buy the same quality feed at market. For many farmers, growing forages is the best way to reduce costs, improve yields and increase profits.

Forages fall into two categories:

- Bulk forages include grass, hay and straw. Bulk feeds provide most of the energy that an animal needs and usually make up 30–70% of an animal's diet.
- While bulk forages are a good source of energy, most bulk forages contain only low or medium levels of protein. Bulk forages should be combined with other types of feed and supplements to make sure that animals get enough nutrition to stay healthy.
- Supplementary forages contain greater amounts of protein and other nutrients per kilogram compared to bulk forages. Farmers usually give small amounts of supplementary forages to animals that require extra nutrition, such as lactating and pregnant cows.

To make sure that dairy cattle receive sufficient nutrition, farmers need to grow a combination of bulk and supplementary forages.

Table.1 Recommended forages.

Bulk forages	Supplementary forages
Brachiaria	Calliandra
Bush rye	Desmodium
Cenchrus ciliaris	Lablab purpureus
Love grass	Lucaena
Napier grass	Lucerne
Oats	Sweet potato (dual-purpose)
Rhodes grass	
Rye grass	

1.1 Recommended forages

Table 1 lists several types of bulk and supplementary forages that are known to help dairy cattle produce large amounts of high-quality milk. In part 2 of this topic, I review the advantages and disadvantages of each type of forage, to help you determine which forages are most suitable to cultivate on

1.2 Choosing forages to cultivate

When selecting forages to cultivate, there are many factors to consider, including:

- Climate.
- Altitude.
- Rainfall.
- Type of soil.
- Diseases and pests.
- Drought resistance.

1.2.1 Climate

Different fodder crops grow better in different climates. To receive the full benefit of cultivating their own forage, farmers need to select crops that are suitable for their local rainfall levels, temperatures and elevation.

1.2.2 Soil

Most forage crops grow better in certain types of soil than others. When deciding which crops to grow, farmers should consider the following qualities of the soil on the farm:

- **Fertility:** Certain crops require more nutrients in the soil than others. Soil fertility can be improved through the application of mineral fertilizer, and compost or manure.
- **Acidity:** Soil can be acidic, neutral or alkaline. Most crops grow well in neutral soils, but many crops do poorly in highly acidic or alkaline soils. This can also be managed in some cases through application of manure.
- **Salinity:** Salt can enter soil through rain, ocean winds or other sources. Some species are better able to tolerate salinity than others.
- **Texture:** Different crops favour different mixtures of sand, silt and/or loam.
- **Depth:** Some crops require deeper soils to support their root systems than others.
- **Drainage:** Some crops require that an area be well-drained, and will not thrive if soils becomes water-logged.

Drought resistance

Periods of drought can be a problem for dairy farmers.

While no crop can grow without water, some crops are better able to survive in periods of drought than others. Farmers in areas where drought is common should consider planting forages that are known for their drought resistance or at least avoid forages that are especially vulnerable to drought.

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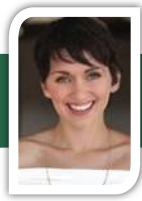
Table 2 The following table lists the best climate zones for cultivating each of the recommended forages.

Climate zone	Grasses	Legumes
Semi-arid		
Semi-arid land typically has an elevation of 1000–1800 m and receives less than 65 cm of rainfall each year.	Bush rye Cenchrus ciliaris Love grass	Velvet bean
Warm, wet, medium altitude This includes areas with an elevation of 1200–1850 m that receive 1000–2500 mm of rainfall each year.	Lablab purpureus Oats Rhodes grass	Calliandra Desmodium Desmodium Leucaena
Cool, wet, medium altitude This would include areas with an elevation of 1850–2400 m that receive 1000–2500 mm of rainfall each year.	Napier grass Oats Rhodes grass Brachiaria Sweet potato (dual-purpose)	Lucerne
Cold, wet, high altitude This would include areas with an elevation of 2400–3000 m that receive 1000–2500 mm of rainfall each year.	Oats Rye grass	Lucerne

The Writer is an International Dairy Expert. He has worked as Dairy Scientist for UNDP in Tanzania, Technical Dairy Specialist for the East Africa Dairy Development in Kenya, Uganda and Rwanda and recently as Project Coordinator for the EU funded Transforming the Zimbabwe Dairy Value Chain for the future (TranZDVC). He is reachable on: Email: edsonchifamba@yahoo.co.uk Mobile: +263 774 836 438

Reducing health risks from pests in agriculture



Jane Marsh

Crop Spraying

AGRICULTURE is one of the pillars of human civilisation, but its industrialisation has allowed pests to spread like never before. Pests destroy crops in many ways:

- Eating leaves of crop plants
- Sucking out plant juices
- Boring into the leaves, roots and stems
- Spreading plant pathogens
- Feeding on natural fibres

These actions compromise wood (the most essential building material), contaminate stored crops and accelerate plant decay. As a result, about 40 percent of food crops fall to pests and pest-caused diseases every year.

This waste contributes to food shortages and harms poor rural communities the most. Of course, they also cause direct harm to humans through bites, stings, diseases and general annoyance.

How can we reduce the health risks that pests cause throughout agriculture, and how do we account for climate change's increasing impact? Let's explore what humanity has done to combat these issues.

Successes and Failures of Pesticides

Pesticides are the primary combatant against insects that target our crops. The greatest victory that pesticides have contributed to is increased food production in developed nations. Maize, wheat and other essential harvests dramatically improved in the late 20th century and into the current age. A greater quantity of healthier crops leads to a healthier population. Plus, additional revenue from agriculture can help improve medical care and education.

Pesticides do not just defend our crops — they seek out threats and eliminate them. Removing weeds would cause a significant increase in yields of dryland crops, which primarily impacts the African continent. Pesticides also stop vector-borne diseases, such as malaria and typhus, in their tracks by killing the insects that carry them. This function benefits at-risk communities in developing countries the most.

However, the chemicals used to kill weeds and insects also harm human bodies. Pesticides affect the air we breathe, the water we drink, and the non-plant foods we eat. An estimated 1 million people develop chronic diseases from pesticide poisoning every year. Farmers and other agriculture workers are naturally the most at-risk, which can cripple the workforce of agrarian countries.

Pesticides are simple and distributable defences against harmful insects, but the aftershock of effects on human health may force us to seek alternative solutions in the near future. We also have to address the expanding elephant in the room: climate change.

Impacts of Climate Change

Climate change impacts temperature and precipitation, which happen to be the two leading determinants of where pests spread their diseases. Insects like to settle down in warm and humid environments, so climate change can work to their advantage. However, too much moisture can restrict growth by washing away insect eggs and larvae from the host plants.

This dilemma has forced insects to move to moderate regions with more stable heat and rainfall levels. They are migrating from equatorial regions toward the north and south poles. That means vector-borne diseases will come into contact with healthy crops and populations, giving rise to new issues, such as wheat rust.

Climate change has also increased carbon dioxide levels in the atmosphere, which makes plants nutritionally weaker and more susceptible to diseases carried by pests.

New Agricultural Standards

The best thing we can do to fight the spread of pests and diseases is to improve our monitoring systems. Global surveillance must reach new levels of proactiveness, and countries must collaborate more closely with each other.

We have begun to develop early warning technologies that allow us to detect diseases in plants within days of contamination, allowing farmers, researchers and officials to make informed decisions in a timely manner.

Scientists have also attempted to breed disease-resistant plants in the hopes of creating immunised alternatives to our current vulnerable crops. This solution is a work in progress, but it shows great promise.

We should also remember natural and biological solutions to pest control, such as recruiting the help of beneficial insects. Ladybugs, spiders and dragonflies prey on caterpillars and other common, disease-ridden bugs. Tools such as light traps and pheromone traps can catch pests before they cause significant damage.

The International Plant Protection Convention (IPPC) has also announced new eco-friendly standards for pest fumigation. Fumigants must now adhere to temperature, duration and quantity requirements to reduce their emissions and protect the environment.

The IPPC's new standards will also change how countries trade their plant goods and hopefully create new opportunities for developing countries.

Pest Control Requires Climate Control

If we want to control the spread of pests and diseases through agriculture, we must also reduce artificial climate change. Climate change promotes insect growth and migration through rising temperatures and rainfall, enabling foreign diseases to reach fresh populations.

We must increase our surveillance efforts and look to more natural and eco-friendly solutions to reduce health risks from pests in agriculture.

Successful Mangetout Peas Production in Zimbabwe

Desire Tavengwa

RENOWNED for its diverse agro-ecological regions, Zimbabwe has emerged as a hotspot for the production of high-quality export crops. Among these is mangetout, a type of snow pea cherished in European markets for its crisp texture and sweet flavour. The rise of mangetout peas as a major export crop in Zimbabwe's agricultural landscape is a testament to the country's innovation, resilience, and the strategic adoption of sustainable farming practices.

The Rise of Mangetout Peas

Zimbabwe's favourable climate, particularly in the cool highlands of regions such as Nyanga, Marondera, and Manicaland, has played a pivotal role in the crop's success. These areas experience mild temperatures, especially during winter months, which are ideal for mangetout production. The crop thrives in cool conditions, requiring temperatures between 10°C and 25°C to produce the best quality pods.

While mangetout peas are a relatively new crop compared to Zimbabwe's traditional staples like maize and tobacco, their potential for export markets caught the attention of farmers seeking to diversify their income streams. By the early 2000s, Zimbabwean farmers had recognized the demand for high-quality vegetables in European supermarkets, and mangetout peas became a key product in the country's horticultural export basket.

Collaboration and Expertise

One of the most important contributors to the success of mangetout production in Zimbabwe has been the collaboration between local farmers, international agronomists, and buyers from Europe. Early adopters of mangetout production learned from agronomists how to manage the delicate balance of irrigation, pest control, and nutrient management required for high yields and quality pods.

Government bodies like ZimTrade and private initiatives have played an important role in linking local producers with international markets. These partnerships also provide crucial support through technical training, funding, and access to quality seed varieties. Farmers are trained in Good Agricultural Practices (GAP), ensuring their produce meets the stringent quality and safety standards required for export.

Additionally, contract farming schemes have helped small-scale farmers venture into mangetout production by providing them with the necessary inputs and a guaranteed market. Large-scale commercial farms, some of which have embraced out grower schemes, have also been instrumental in aggregating produce, ensuring that even small producers can contribute to export volumes.

The Role of Sustainability

Sustainability has become a cornerstone in the success story of mangetout peas in Zimbabwe. Conscious of the growing global demand for sustainable agriculture, many producers have adopted practices that minimize environmental impact while maintaining productivity. The use of drip irrigation systems to optimize water usage is a key example. As water becomes an increasingly scarce resource, efficient irrigation systems ensure that farms can maintain high output without depleting local water sources.

Furthermore, integrated pest management (IPM) techniques have reduced the need for harmful pesticides, promoting ecological balance. This shift has not only made Zimbabwe's mangetout more attractive to international buyers concerned with sustainability but also improved the long-term health of local farming ecosystems.

Challenges and Resilience

Like any agricultural venture, mangetout production in Zimbabwe has faced its share of challenges. Erratic weather patterns, the high cost of inputs, and fluctuating international market prices have all posed risks to producers. However, Zimbabwe's farmers have proven resilient, employing innovative solutions to mitigate these challenges.

For instance, some farmers have installed greenhouses to protect their crops from unexpected frosts or heatwaves, ensuring a more stable supply of high-quality peas. Investment in cold storage facilities has also been crucial in maintaining freshness during the post-harvest handling and transportation stages.

Looking Ahead

The future of mangetout pea production in Zimbabwe looks bright. With increasing interest in sustainable, high-value crops, the country is poised to maintain its competitive edge in the global market. Continuous improvements in technology, access to funding, and strong partnerships between farmers and export markets will undoubtedly fuel the sector's growth.

Zimbabwe's success story in mangetout pea production is a powerful example of how innovative farming practices, strategic partnerships, and adaptability can transform challenges into opportunities, paving the way for agricultural prosperity in a competitive global market.

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