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Hybrid or open pollinated variety seed – weigh up the options

Grain SA magazine for developing producers

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PRODUCERS PROVIDE A RANGE OF REASONS WHY THEY MAY NOT INVEST IN HYBRID SEED, SUCH AS HIGH SEED COST, LACK OF FINANCE AT PLANTING, NON AVAILABILITY OF HYBRID SEED, THE NEED TO PURCHASE FERTILISER, SMALL OR NO DIFFERENCE IN YIELD, LACK OF ADAPTATION, POOR STORAGE AND POOR PROCESSING QUALITY OF COMMERCIALLY AVAILABLE HYBRIDS.

These arguments have raised questions, whether hybrids have an advantage over open pollinated variety (OPV) for resource-poor producers where unreliable seed availability, low input use and crop failure is common. The real question is which variety type: hybrid or OPV is the most sustainable for the producer to achieve food security and support a sustained income.

Seed is a key input in all crop production. All cultural practices are designed to exploit the full genetic potential of the seed sown. No agricultural practices (for example tillage, cultivation, weeding, fertiliser, pest and disease control) can increase crop yields beyond the limit set by the seed quality. Seed is therefore the baseline for success or failure of the crop planted.

To achieve high yields, one must plant high quality seed. To be assured of good quality seed, one should buy and plant certified seed, whether it be hybrid or OPV. Certified seed is at least 98% pure and has a germination percentage of at least 90%. The cost of certified seed is offset by its higher yield potential.

Small scale and subsistence producers faced with cash constraints, often plant maize saved from the previous harvest. If they do this with saved grain from hybrid maize, they often have reduced yields (up to 50%) compared to maize grown from fresh seed. However, planting grain saved from open pollinated varieties does not result in yield losses.

What is a hybrid?

A hybrid is the product (first generation progeny) of a cross between two unrelated (genetic dissimilar) parents, one designated female and the other male. Self pollination is the process of taking the pollen from a single plant and applying this to the silks of the same plant. When maize is self pollinated, each generation becomes weaker. This is known as inbreeding, and after successive generations, this leads to weakened plants called inbred lines. These inbred lines are small in size, have small cobs and reduced yields. However,

Mme Jane says...

In the news recently, there has been much about the ANC Youth League speaking about land (and banking and mining) and it is very interesting to see how different people think about the whole land question.

I see land as a resource from which we have to produce food and fibre. Many things on the earth are increasing every year – people, domestic animals, cars etc. But the land cannot increase – it is limited. If you think about the fact that there are more and more people, with less and less productive land (because we must remember that people use space for their homes – cities grow using up land), we have to make sure that every piece of land is producing optimally.

In South Africa today, we have a complex situation where much of the productive agricultural land is being farmed by white commercial producers. Now there is talk of taking this land away without payment and giving it to black people. On the other hand, there is a lot of land under communal tenure (under the tribal authority) and much of this land is not being productive. There are also many thousands of hectares of farm land that have been redistributed through the programmes of the department of land affairs. Is this about the colour of the skin of the person? In my opinion, NO – to be a successful subsistence, small holder or commercial producer has nothing to do with the colour of your skin.

We know that to be a successful producer, you need knowledge and skills, machinery, markets and finance for production inputs. Simply giving land to someone does not make them a producer – if you stand in a garage, you are not a car! If you have land, you are not a producer. If you want to be called a producer, you must be using your land optimally – producing as much as you can from your land.

I suggest that we make every effort to give people all the support that they need on the land that they already have so that every piece of land can produce for our nation. When all this land is producing well, then it might be time to worry about other issues. Land is precious, and if you have access to land, you have a responsibility to use it. Let us as producers get into full production and not concern ourselves with the comments being made by the politicians who are out for themselves.

Hybrid or open pollinated variety seed – weigh up the options

when two inbred lines are crossed, the vigour is restored in the resulting seed and the yield of the plants grown from the seed is greatly increased. This is known as hybrid vigour. It occurs as a result of the interaction between the sets of genes obtained from the two different inbred lines.

Hybrid maize has the following characteristics:

1. It has a uniform appearance;
2. It has vigour;
3. It is high yielding;
4. It is selected for improved grain quality; and
5. A particular hybrid can be selected for a specific pest and disease resistance or drought tolerance.

Advantages of growing hybrid maize are:

1. Hybrids are generally higher yielding than open pollinated varieties.
2. Hybrids are uniform in colour, maturity and other plant characteristics which enables the producer to carry out certain operations (for example fertilising, spraying and harvesting) at the same time.
3. The uniformity of the grain harvested can also have marketing advantages when sold to buyers with quality standards.
4. Hybrid yield on average 18% more than OPV.

Disadvantages of growing hybrids:

1. Seed is expensive.
2. The producer needs to yield more than two ton per hectare to justify the higher cost of seed.
3. New seed needs to be purchased every planting season.
4. The grain produced from hybrid seed may not be used as seed for the following planting seasons.
5. The producer might not be able to source seed timeously.
6. Hybrids are more susceptible to stress conditions (for example tasselling).
7. Under poor crop management and harsh environmental conditions, the yield advantage of hybrids over OPV's is diminished.

What is an open pollinated variety (OPV)?

An OPV variety is one whose seed is produced by random cross pollination (that is there is no pollination control). The pollination of the plants in the field is not controlled, which means the crop will not be uniform, for example the crop will vary in plant height, the colour of silks will vary, the cobs will not be the same size and shape and the plants will mature at different times.

Advantages of growing OPV:

1. Low or no seed cost. The producer can keep part of the crop for seed.
2. The cost of seed is a lot less than hybrid seed.
3. More money can be spent on buying fertiliser or pesticide.
4. Seed can be recycled. That is grain from this season can be planted next season.
5. Low potential areas cannot justify the high cost of hybrid seed.
6. OPV have a broader genetic base and are more variable in flowering dates. This results in a longer flowering period, which will enable an OPV to pollinate during short periods of high stress (for example moisture stress, temperature, etc). This variation can at times, offer more stable yields than more uniformly flowering hybrids.
7. It is important to buy certified seed every three years to maintain genetic purity.

Disadvantages of OPV:

1. The yield potential is typically 10 - 25% less.
2. In high potential areas, OPV's will reduce profit margins.
3. They will not be uniform in colour, maturity and other plant characteristics.
4. Could impact on the price of the grain, i.e quality.
5. Lack of uniformity may lead to difficulties in carrying out certain operations, such as spraying and harvesting, (especially when using a combine harvester).
6. To keep an OPV pure, it should be planted at least 300 m from other varieties.
7. Poor seed quality (seed kept for planting of the next crop is usually stored in poor conditions and is exposed to high temperature, pests and diseases) can result in poor germination and weak plants that cannot compete well with weeds.
8. As a rule, OPV's are not genetically modified to exhibit insect or herbicide resistance.

Harvesting open pollinated seed

1. First, grow an OPV that is recommended for your area.
2. Manage your fields well, practicing conservation agriculture, using fertiliser, manure or both. Control weeds and pests.
3. Grow your crop at least 100 m away from other maize fields, or sow your maize three weeks earlier or later than nearby crops, so that it tassels at a different time. This way you will ensure unnecessary contamination of pollen does not occur.

4. You should harvest from the middle of the field to minimize pollen contamination.
5. Before tasselling, inspect your field and remove any plants that look very different from the others (i.e if very tall or very short or diseased).
6. At harvesting, choose the best cobs from the best looking plants. Select cobs that are uniform, free of disease and have the desired grain quality.
7. Harvest at least 300 cobs.
8. The cobs should be shelled, dried and stored under the appropriate conditions (a dry and protected dark area).
9. Make sure the seed is dry (the life of the seed is doubled for each 1% decrease below 13% in moisture content). To test if your seed has about 13% moisture content, take 100 seeds and mix with 1 g of salt and leave in a sealed bottle. If after 5 minutes the salt feels moist, then the cobs need more drying.
10. Seed lasts longer in cold conditions (not freezing). The life of a seed doubles when the storage temperature is lowered by 5°C.
11. Weevils, fungi and bacteria shorten the life of seed. To minimise this, keep the seed as dry as possible.
12. Store your seed in dry, clean, airtight containers and label them (next year you will not remember what it was).

Materials that stop the growth of pests

Dry ash

This absorbs moisture inside the container and prevents the growth and increase of weevils. Add 0,5 kg of ash for one kilogram of seed.

Lime

This can be used in the same way as dry ash. Mix 15 teaspoons (50 g) with every one kilogram of seed.

Cooking oil

Mix cooking oil with your seed to prevent an increase of weevils. Use one teaspoon of oil for one kilogram of seed.

Dried and powdered leaves from different aromatic plants

Weevils are sensitive to strong smelling plants. Use chilli (mix five teaspoons of chilli powder with one kilogram of seed).

Aloe

Dry and crush the leaves and mix five teaspoons for every one kilogram of seed.

Benefits from hybrid seed and open pollinated seed

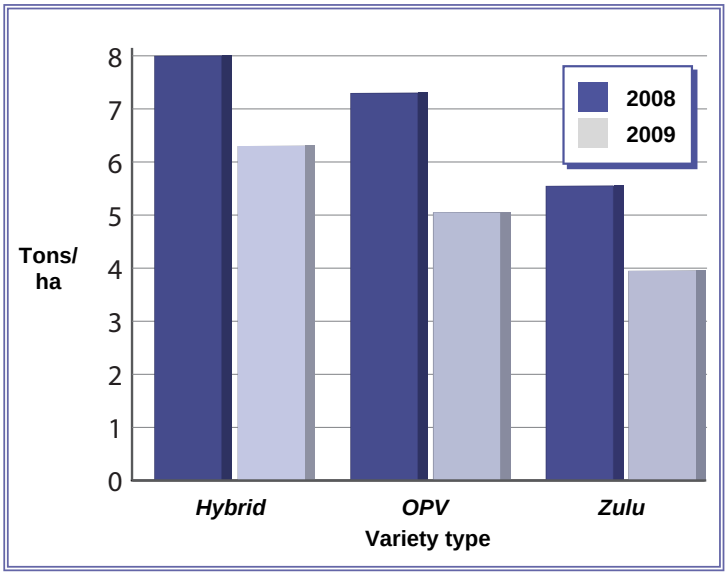
	Hybrid	OPV
Access to genetic gain.	High.	Medium.
Benefit from seed treatment and quality control.	High.	Only when purchased as certified seed.
Presence of a viable seed supplier that provides access to new genetic material.	Likely.	Questionable.
Independence of farming community	Low.	High.

A very good hybrid may out-perform a poor OPV by more than 70%. However, a good OPV may be similar performing or even out-perform a poor performing hybrid. The effect of planting a second generation (harvested) seed is negligible for an OPV, but it is severe for a hybrid (up to 50% loss). Elite hybrids produce 18% more grain than elite OPV's. Recycled seed produces 32% less grain than new hybrid seed. Recycled OPV seed produces 5% less grain than fresh OPV seed.

If certified seed is purchased, the cost of seed will be higher than when fresh OPV seed is purchased or recycled. The ranking of the grain yield at any given management level will be:

1. Hybrid;
2. OPV;
3. Recycled OPV; and
4. Recycled hybrid.

Figure 1: Mean grain yield obtained during 2008 and 2009 seasons.



Purchasing hybrid seed every year, becomes the most profitable option, once management levels are two tons per hectare or higher. As management levels increase, the recycling of seed becomes less profitable. There is very little benefit to the producer if switching from OPV seed to hybrid seed, without fertiliser and there is no change in management. If the producer is to purchase hybrid seed at a higher cost, his management level must increase accordingly.

Cross-pollinated maize.

Organise properly – it is an essential management task

To be in a position to implement your plans for future activities and to achieve your objectives for your business, it is necessary to organise properly and in time.

In the June 2011 Pula/Imvula the article, half a plan is better than no plan, planning was discussed as a management task. The second management task we will discuss is organising. Organising implies that you must systematically prepare to implement your plans for future activities. However, in practice planning and organising is many a time done at the same time. Practically, organising involves deciding who is going to do what and when and where and how and deciding what other resources such as machinery, equipment, tools, implements, structures and also funds will be required to implement the plans.

Therefore to be able organise properly it is of the utmost importance that a producer knows his resources – physically and humanly. As far as his employees are concerned the producer must know their skills, education, training, capabilities (physically, technically and emotionally), experience, strengths and weaknesses. Employees must be used where they perform the best and if possible they must do what they enjoy to do. It is also necessary to prepare in advance and to ensure that the necessary transport, equipment, implements, production inputs and funds will be available at the correct place and time.

To organise one must consider all the activities as planned and consider the allocation of resources to be in a position to implement the plans on the time as decided upon.

In terms of practical organising one can combine the planning and organising as illustrated in **table 1**. This example is a continuance of the example used in the previous article regarding planning.

Table 1: Planning and Organising: Week 9 - 13 May 2011

Monday 9 May	Planned activities	Employees involved	Other resources
Maize	• Scout land five.	• Jan.	• Motorbike (travel). • Record book.
Sunflower	• Harvest land three – 10 hectares.	• Piet (driver). • Padiso Vosloo and two temporary employees.	• Harvester. • Two tractors and trailers.
Cattle	• Observe cattle. • Check lick and creep feed 3. • Wean, mark, dose and weigh 100 calves.	• Klasie. • Klasie. • Moloto, Abram, Kagiso and Hendrik.	• Horse, record book. • Horse, record book. • Cattle handling facilities, branding equipment, remedies and dosing tools, scale, record book.
Broilers	• Prepare house three (remove old bedding). • Daily activities. • House one and two.	• Johanna, Minah and Johannes. • Sarah, Monica and Dawid.	• Scoopers, bags and trailer. • Loose hand tools.
General Work	• Paint workshop.	• Private contractor.	• Own tools, etc.

For purposes of the example it is assumed that all employees are properly trained and skilled. Furthermore all other resources are available and ready for use. If this is not the case your plans and organising will have to be extended to include the training of staff, preparing other resources to be available and ready when the actual task, such as planting or inoculation of livestock, need to be attended to.

This is just an example of a method to be used to organise and can be adjusted quite easily to suit individual circumstances and preferences. Practical experience has shown that it is a great assistance to plan and organise properly by doing it in a written form. As with planning, organising could be done in a diary, in any type of script, on a board of some sort, electronically or any other suitable means.

Just as with planning, during the process of organising the manager needs to be committed to his other management activities namely leadership, communicating, motivating, delegating, coordinating, making decisions and maintaining discipline. The extent of involvement in these activities will mainly be determined by the size of the business.

The producer must take the initiative with organising, communicate the organising with his employees and make decisions regarding the organising (which tractor will be used or which implement or which employees). He must also maintain discipline and coordinate organising within different sections of the business. He must also be able to delegate organising tasks if need be; the producer cannot do everything himself.

Remember should one of the management tasks not be executed properly, your business could still make a profit but sooner or later – be it five years or ten years or longer – your business will grind to a halt. And that is also the challenge for the future – if your management does not improve every year – eventually your business will come to a halt, being that profits are not made any more. One cannot do things the same way every year. You must improve by increasing your income and/or controlling your expenditures. Proper organising is an important tool to achieve the above mentioned.

INFORMATION COMPILED FROM THE FARM MANAGEMENT FOR PROFITS MANUAL BY MARIUS GREYLING

3 Hybrid or open pollinated variety seed – weigh up the options

Maize producers grow maize and can quantify the value of their maize as a cash crop. Yet, we know that household food security, risk aversion, preferences and tradition, play an influential role in producers' decisions about planting material as well as crop management practices. Similarly, household seed security is an important consideration for recycling grain as seed, particularly in remote areas that are not served by seed suppliers. Access to grain markets where fair prices are predictable, must be an important consideration for resource-poor producers when deciding on which seed to buy. There are many social and cultural dimensions to the hybrid versus OPV issue.

OPV's may be a valuable option for maize producers under some circumstances, but the use of an OPV or recycled seed would be a step backward for grain yield. Generally, a hybrid will produce 18% more grain than most of the better OPV.

Factors to consider when deciding on variety types

- Access to benefit from research in genetic improvement of new varieties.
- Access to benefit of seed treatment and seed quality.
- Presence of a viable seed supplier.
- Livelihood strategies of resource poor communities.
- Economic analysis of returns of investment (yield).

Factors to consider when selecting cultivars

- Yield reliability.
- Drought tolerance.
- Disease tolerance.
- Standability.
- Insect tolerance (BT).
- Length of season.
- Maturity time.
- Drying rate.
- Acid tolerance.
- Chemical resistance (round-up ready maize).

IAN HOUSEHAM, PROVINCIAL CO-ORDINATOR OF THE GRAIN SA FARMER DEVELOPMENT PROGRAMME

Focus on the Khanyayo Study Group

Study group name
Khanyayo study group.

Where is the study group situated?
The study group is situated in a rural area with little or no infrastructure, approximately 60 km from Bizana in the Northern Eastern Cape.

Membership of the group
The study group consists of 100 members.

Arable land available for production
100 hectare of arable land is available for production.

Total hectares planted during 2010/2011 season
40 hectares.

Reasons why not all the arable land is not planted?
1. Lack of finance.
2. Lack of inputs.
3. Lack of equipment.
4. Lack of fencing.
5. Climate – in the beginning of the 2010 planting season, rains came late and it was too wet to plant.
6. Distance from suppliers to get inputs, for example fertiliser, seed and chemicals.

How often does the study group meet?
The study group meets with Grain SA on a monthly basis and they meet together weekly to discuss farming.

What are the advantages of being a member of the study group?
The advantages of being a member of the study group is the transfer of knowledge, study group discussions, to see correct agricultural practices from soil sampling, planting, herbicide application and trials. The Khanyayo study group were fortunate enough to attend the, Introduction to Maize course.

Is there any interaction between the study group and the commercial farming sector?
There are no commercial farmers in the vicinity yet!

How has the study group benefited from Grain SA?
1. By means of study group meetings, they have gained knowledge, by being able to discuss and communicate the advantages and disadvantages of the correct planting practices.
2. Demonstration trials have had an impact on the benefits of chemical and fertiliser application.
3. As a result of forming a study group, they formed a buying group within the study group to buy chemicals and fertiliser.

IAN HOUSEHAM, PROVINCIAL CO-ORDINATOR OF THE GRAIN SA FARMER DEVELOPMENT PROGRAMME

Implement your plans effectively

ONCE PLANS FOR FUTURE ACTIVITIES HAVE BEEN FINALISED AND THE HUMAN AND PHYSICAL RESOURCES ORGANISED, IMPLEMENTING OF THE PLANS TO THE REQUIRED STANDARD MUST BE ENSURED.

The implementation of actions and tasks planned is aimed at achieving the objectives of the business. It would therefore rather be foolish to be very thoroughly regarding planning and organising and then to neglect implementing. Vice versa, the success of implementing can be hampered by poor planning and/or organising. Let's pay attention to implementing, being the third management task.

In practical terms and with reference to the previous articles on planning (June Pula Imvula) and organising (page 4), come the day of for example 9 May 2011, what was planned and organised must then be implemented. For example:

Table 1: Planning and Organising: Week 9 - 13 May 2011

Monday 9 May	Planned activities	Employees involved	Other resources	Implementation
Maize	• Scout land five.	• Jan.	• Motorbike (travel). • Record book.	• Completed, no disease noted.
Sunflower	• Harvest land three, ten hectares.	• Piet (driver). • Padiso, Vosloo, two temporary employees.	• Harvester. • Two tractors and trailers.	• Completed nine hectares.
Cattle	• Observe cattle. • Check lick and creep feed. • Wean, mark, dose and weigh 100 calves.	• Klasie. • Klasie. • Moloto, Abram, Kagiso and Hendrik.	• Horse, record book. • Horse, record book. • Cattle handling facilities, branding equipment, remedies and dosing tools, scale and record book.	• Cattle in order. • Creep feed in camp three filled up. • 100 calves and activities completed.
Broilers	• Prepare house three (remove old bedding). • Daily activities houses one and two.	• Johanna, Minah, Johannes. • Sarah, Monica, Dawid.	• Scoopers, bags and trailer. • Loose hand tools.	• House prepared. • Daily activities done.
General work	• Paint workshop.	• Private contractor.	• Own tools, etc.	• Work proceeding satisfactorily.

Implementing is specifically carried out by the human resources department or the employees of the business and they must thus be activated to do the work efficiently. For implementing to really be successful, it is all the more required of a manager to be committed to his other management activities namely leadership, communicating, motivating, delegating, co-ordinating, taking decisions and maintaining discipline.

Practical implications

Strong internal leadership from management is required to successfully drive the process of implementation and better methods of executing the plans must be sought continuously. Managers must take the lead in the implementation process, not by doing everything himself but by activating his employees. To activate employees they need to be motivated. Management must get people to move to do what they should do to the best of their ability. During the implementation process the necessary guidance need to be provided by management, it helps to activate people.

Clear communication is of the utmost importance to make a success of the implementation process of the envisaged plans. Instructions must be clear and precise. Everybody involved with a specific implementation process must know who must do what, when, at what standard and where they are heading.

During implementation delegation is important. The manager cannot do everything himself. The extent of delegation will mostly be determined by the size of the business and/or the specific task. It will also depend on whether management wants to be more actively involved in the process of implementation, or whether they will be on the sideline acting in an advisory management capacity.

PULA IMVULA

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Our aim is to produce the best publication possible. Please direct any comments on the editorial content or presentation thereof, to Jane McPherson.

Implement your plans effectively

It is important to pay attention to proper coordination between sections. The gears of the business must run smoothly for the implementation to be successful. Should coordination be hampered it will waste time and therefore money. Remember income - expenditures = profit or a loss. From our example should the dosing remedies for the calves not be available the Monday morning, implementing the task will be delayed.

In practice it is quite often required from management to take decisions urgently to keep the implementation running smoothly. Should a tractor have a flat tyre whilst harvesting, how will the challenge be addressed? Use another tractor?

Maintaining discipline of the employees at all times is of the utmost importance to ensure proper implementing. Is work being done below the set standard acceptable? If this ill discipline is not addressed in a proper manner it can seriously jeopardise the implementing of actions.

Prioritising

In practice there will normally be more than one task to attend to and remember unforeseen actions may occur – veld fires, your prize bull stuck in the mud in a vlei. From experience we know not all actions or tasks can receive attention at the same time. A decision must be taken as to which actions/tasks need attention foremost – that is prioritising.

Tasks or work that has an impact on income and/or expenditure and/or affects your employees, for instance they are required to work overtime, must be regarded as important. Tasks can be classified as follows:

- High importance/high urgency;
- High importance/low urgency;
- Low importance/high urgency; and
- Low importance/low urgency.

Tasks or work of high priority can be seen as tasks of high importance/high urgency. High importance indicates that the tasks can have an impact on income - if done immediately it will increase income - if not done it might lower income. And/or it could be work that can have an impact on expenditure. If not done immediately it will increase expenditure.

Urgency relates to the time you have available to get a specific task done – it must be done immediately/today or it can be done later. While busy harvesting a crop and a mechanical failure is experienced, the repair of the implement or tractor will be treated as a task of high importance/high urgency – high priority. Similarly with a cow experiencing difficulty with calving, especially if it is one of your stud cows. Filing to be done in the office will be treated as a task of low importance/low urgency, or low priority, it can be done later.

Therefore it is necessary and very important, to achieve all objectives of your business, to be very thorough regarding the implementation of all plans to the required standards set.

INFORMATION COMPILED FROM THE FARM MANAGEMENT FOR PROFITS MANUAL BY MARIUS GREYLING