THE COST ADVANTAGE OF IRRIGATION

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Various climatological data points to the fact that South Africa is currently in a typical eight to 10-year dryer rainfall cycle weather pattern. Moisture is scarcer, and for this reason yields are more unpredictable. This forces many farmers to consider the option of irrigation. Besides the higher yields, there are a couple of other factors that also have to be taken into account before a farmer goes ahead, puts up a pivot system and starts irrigating his or her crops.

The most important factor of irrigation is a constant water source. Obviously the replenishment of water sources is also dependent on rainfall, and during a dry rainfall cycle the availability of water will not necessarily be a given. This past year particularly has shown that water sources can dry up in the middle of the growth season and that all the costs and trouble incurred to get the crop to such an advance stage could be in vain. So, a farmer considering irrigation should first of all insure he or she has a constant water source to his or her disposal, and then only can further planning be done.

Some crops cannot be approached without irrigation. This is especially true for capital crops such as citrus and stone or deciduous fruit. This article will, however, only concentrate on cash crops and especially on cases where a farmer has to make a decision between dry land or irrigation for this kind of crop.

Capital

There are various irrigation methods. The most prominent kinds are drip irrigation and pivots. Drip irrigation needs less start-up capital than pivots, but it creates practical problems during cultivation with regards to certain crops. Potatoes can easily be irrigated by drip, while it is not so well suited to wheat or maize. The comparisons made accordingly are for wheat, maize and potatoes. The total is thus based on pivot and not on drip lines.

The capital outlay for the typical erection of a pivot system for 40ha appears in table 1.

TABLE 1	**Rand**	**Rand/ha**
Soil preparation	25000	625
Mother lines	28000	700
Pump	40000	1000
Pivot	340000	8500
TOTAL	**433000**	**10825**

The total capital outlay for a pivot system that can irrigate 40ha amounts to an estimated R433 000. This implies that it amounts to R10 825/ha to erect a pivot system. This amount can vary between farmers depending on the existing irrigation structures on the farm and how much of the preparation and erection the farmer can shoulder him- or herself.

Cost per hectare

A cost comparison between dry land and irrigation for wheat, maize and potatoes appears in Table 2. When the cost per hectare is considered, there is a sizeable difference between dry land and irrigation. In the case of wheat, the total cost amounts to R2 575/ha compared to R7 851/ha. For maize it is R2 872/ha compared to R7 291/ha, while it is R28 047/ha for potatoes compared to R54 642/ha. The difference in cost especially creeps in with the direct cost, where the higher plant density under irrigation gives way to an increase in seed and fertilizer. The mechanization cost remains the same under both systems, while the variable costs (insurance and interest) also increase as the yield and the direct costs increase.

Table 2 also indicates that, besides an increase in certain costs per hectare, there are also additional costs in the case of irrigation. The electricity, water rights and repairs to pivots amount to a further R359/ha while provision is also made for interest on the additional capital outlay of R1 245/ha. Only the expenses were brought into calculation for each crop, and no provision was made for capital payments or management remuneration of any nature.

Cost per yield unit

Cost per hectare is not necessarily the correct standard according to which a cost comparison between dry land and irrigation should be made. The correct comparison is to do a cost comparison per yield unit, namely cost per tonne in the case of wheat and maize and cost per bag in the case of potatoes. Should this be used as calculation norm, the breakeven price per tonne indicates that the irrigation crops, at the yield potential used in the table, can be produced at a lower cost than dry-land crops in all cases. In the case of wheat the cost per tonne amounts to R1 122 for irrigation compared to R 1287 for dry land, while it is R729 for maize compared to R821. Irrigation potatoes are produced at R9.11 per bag while dry-land potatoes are produced at R11.22 per bag. This cost is directly depended on the yield and will thus change linearly as the yield changes. A lower than expected yield will thus give way to an increase in cost, while a higher-than-planned yield will give way to a lowering of cost. This is true for both dry-land and irrigation crops.

Constant yields

The main benefit of irrigation is that, especially over a couple of production seasons, it gives way to a more constant yield provided the source of water remains constant and available. So it is safer to risk a yield prediction for irrigation than for dry land. For this reason an irrigation farmer can calculate a more reliable cost per yield unit compared to his dry-land colleague.

A cost comparison between dry land and irrigation calculated on a hectare basis indicates that irrigation crops demand exceedingly more production costs than dry-land crops. The cost to produce a ton or a bag, what production is all about, indicates that it is cheaper to produce irrigation crops than dry-land ones, even if all the additional costs such as electricity and capital interest are brought into the equation. The condition is, however, that water has to be available at all times to release the right moisture quantity for a yield target to be met.

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TABLE 2	***WHEAT***		***MAIZE***		***POTATOES***	
	Irrigation	***Dry land***	***Irrigation***	***Dry land***	***Irrigation***	***Dry land***
Yield: (Tonne/ha)	*7*	*2*	*10*	*3.5*	*6,000*	*2,500*
Price/ton	*R 1,400*	*R 1,400*	*R 950*	*R 950*	*R 15.00*	*R 15.00*
Rand per year per:	***Hectare***	***Hectare***	***Hectare***	***Hectare***	***Hectare***	***Hectare***
INCOME						
Product sales	*9,800*	*2,800*	*9,500*	*3,325*	*90,000*	*37,500*
GROSS PRODUCTION VALUE	***R 9,800***	***R 2,800***	***R 9,500***	***R 3,325***	***R 90,000***	***R 37,500***
DIRECT EXPENSES						
Seed	*821*	*152*	*1,030*	*333*	*13,800*	*6,440*
Fertiliser	*1,444*	*387*	*1,807*	*616*	*2,877*	*1,531*
Weed control	*92*	*56*	*198*	*197*	*358*	*266*
Pest control	*360*	*120*	*312*	*185*	*4,493*	*2,378*
Spraying cost - Airplane	*297*	*99*	*0*	*0*	*990*	*990*
Harvesting cost (Fuel included)	*504*	*304*	*554*	*247*	*0*	*0*
Irrigation cost (Electricity and repairs)	*359*	*0*	*359*	*0*	*359*	*0*
TOTAL DIRECT COSTS	***R 3,876***	***R 1,118***	***R 4,260***	***R 1,578***	***R 22,876***	***R 11,605***
VARIABLE EXPENSES						
Harvest insurance	*1,420*	*473*	*274*	*120*	*2,400*	*1,200*
Marketing cost	*0*	*0*	*0*	*0*	*8,625*	*4,313*
Packaging	*0*	*0*	*0*	*0*	*5,000*	*2,500*
Casual labour	*0*	*0*	*0*	*0*	*3,500*	*1,750*
Transport cost from land (10 km)	*0*	*0*	*0*	*0*	*500*	*250*
Transport cost	*191*	*64*	*255*	*111*	*6,500*	*3,250*
VARIABLE EXPENSES	***R 1,611***	***R 537***	***R 529***	***R 231***	***R 26,525***	***R 13,263***
ALLOCATED EXPENSES						
Mechanisation costs	*839*	*839*	*949*	*949*	*2,338*	*2,338*
- Fuel	*205*	*205*	*177*	*177*	*497*	*497*
- Depreciation and repairs	*573*	*573*	*696*	*696*	*1,708*	*1,708*
- Operator's costs	*61*	*61*	*76*	*76*	*132*	*132*
Interest on irrigation equipment	*1,245*	*0*	*1,245*	*0*	*1,245*	*0*
Interest on production costs	*281*	*81*	*309*	*114*	*1,658*	*841*
ALLOCATED EXPENSES	***R 2,364***	***R 920***	***R 2,503***	***R 1,063***	***R 5,241***	***R 3,179***
TOTAL EXPENSES	***R 7,851***	***R 2,575***	***R 7,291***	***R 2,872***	***R 54,642***	***R 28,047***
SPLIT MARGIN	***R 1,949***	***R 225***	***R 2,209***	***R 453***	***R 35,358***	***R 9,453***
BREAKEVEN PRICE (Price/tonne)	***R 1,122***	***R 1,287***	***R 729***	***R 821***	***R 9.11***	***R 11.22***
BREAKEVEN YIELD (Yield/ha)	***5.6***	***1.8***	***7.7***	***3.0***	***3,643***	***1,870***