ICARDA
Science for resilient livelihoods in dry areas

NOVEMBER 2020

FACT SHEET

Farm Mechanization and Conservation Agriculture for Sustainable Intensification in Dry Areas:

Business Model Development for "Boudour" Zero-Till Seeder in Algeria

Zohra Ghalem Djender[1], Nasreddine Louahdi[1], Zied Idoudi[2], Boubaker Dhehibi[2], Aymen Frija[2], Mourad Rekik[2]

1. Technical Institute of Field Crops (ITGC)
2. Resilient Agricultural Livelihood Systems Program (RALSP), International Center for Agricultural Research in the Dry Areas (ICARDA)

"Boudour" Zero-Till Seeder in the field (Credit: Nasreddine Louahdi, ITGC)

Understanding the Context

One of the main hindrances to the adoption of Conservation Agriculture (CA) is the limited availability of appropriate and affordable seeding machinery for small to medium sized land-holding farmers. The International Center for Agricultural Research in the Dry Areas (ICARDA) has built a strategic partnership in collaboration with national and private partners through different Projects [including the ACIAR-CANA and the IFAD CLCA Phases (I & II)] to design, test, develop and scale up and out a low-cost seeder in different countries in the Middle East and North-African Countries.

In Algeria, the Zero-Till seeder prototype "Boudour" was developed in 2016 by the Agricultural Machinery Construction-Sidi Bel Abbes (CMA) in collaboration with the Technical Institute of Field Crops (ITGC), National Company of Agricultural Equipment Production & Trading (PMAT) and the Spanish Company SOLA exclusively represented by CMA in Algeria. The low demand for such a machinery was not a good incentive for the company to engage in large scale production. Therefore, the partnership with the Public Field Crops Institute

– ITGC, who are closely working with farmers in the field to test and promote zero-tillage, and their willingness to support the company made a difference.

What is the Innovation about?

Through an awareness program implemented in partnership with ITGC, the demand for the Boudour ZT seeder has increased and the PMAT has already mobilized the first wave of its twenty (20) units of ZT seeder in different parts of the Country. These have been allocated along the cereal-production belt of Algeria spreading from Northern East to Northern west covering Algiers, Constantine, M'Sila, Sidi Bel Abbes, and Setif. About 982 hectares have been planted under zero tillage using Boudour" seeder during the 2019/20 cropping season. Together, ITGC and PMAT were able to further engage the Algerian Government for supporting these seeders acquisition by smallholder farmers in Algeria. The seeder is now included into the national nomenclature of subsidized agricultural machines, at a rate of 30% when the seeder is purchased individually (by individual farmers) and at 40% when it is acquired by a group of farmers or cooperatives.

ICARDA and its partners in Algeria are working now through the IFAD Funded CLCA Project phase (II)[1] to develop financially viable business models for no-till service provision enterprises.

"Boudour" ZT seeder (Credit: CMA-Sidi Bel Abbes)

[1] Use of Conservation Agriculture in Crop-Livestock Systems (CLCA) in the Drylands for Enhanced Water Use Efficiency, Soil Fertility and Productivity in NEN and LAC Countries.

The objective is to support the development of innovative business models and business plans suitable for small entrepreneurs willing to invest in machinery service delivery. An effective and profitable business model where both service providers and farmers can respectively achieve motivating (short term) benefits and reduced costs will certainly induce stronger scaling of CLCA technologies.

The Need for Seeders – Low Cost and Locally Made

Commercially available ZT seeders are mostly manufactured in Developed Countries such as the United States, Australia, and Brazil, where farm sizes are relatively large. They typically cost between $50,000-60,000, which makes them unaffordable for small-holder farmers in Developing Countries.

This factsheet provides economic evidence about the profitability of investing in low cost and locally made ZT seeder (case of "Boudour") individually or through farmers' associations (cooperatives). We start by calculating the cost of direct seeding (hiring ZT seeder) for an individual farmer and for a group of farmers. We then evaluate the financial feasibility of investing in this seeder under both scenarios.

Results suggest that the Break-Even Point (BEP) for the two (2) scenarios is quite similar. The annual usage of the seeder, for an individual farmer, should be greater than or equal to 31.68 hectares to generate profit out this investment. In the case of a collective investment, the annual use of the seeder should be higher than or equal to 30.29 hectares.

This financial analysis shows that the investment in "Boudour" seeder is slightly more profitable when smallholder farmers are investing collectively. The calculated BEP is the same in the different areas of the project since there is no difference in the hiring cost of the seeder as well as labour wages. Hiring services is a very useful method of having access to agricultural machinery especially by small and medium size farms.

The calculations developed in this sheet is thus helping to determine reasonable hiring cost of the Boudour seeder in Algeria.

Profitability Threshold of Boudour Seeder

I. Operating Cost: Understanding and Reducing them for the Business

The cost of operation is divided into two components: i) fixed costs, and ii) variable costs. Fixed costs are independent of operational use while variable cost varies proportionally with the level of use. The main items of the fixed and variable costs are given in Figure 1.

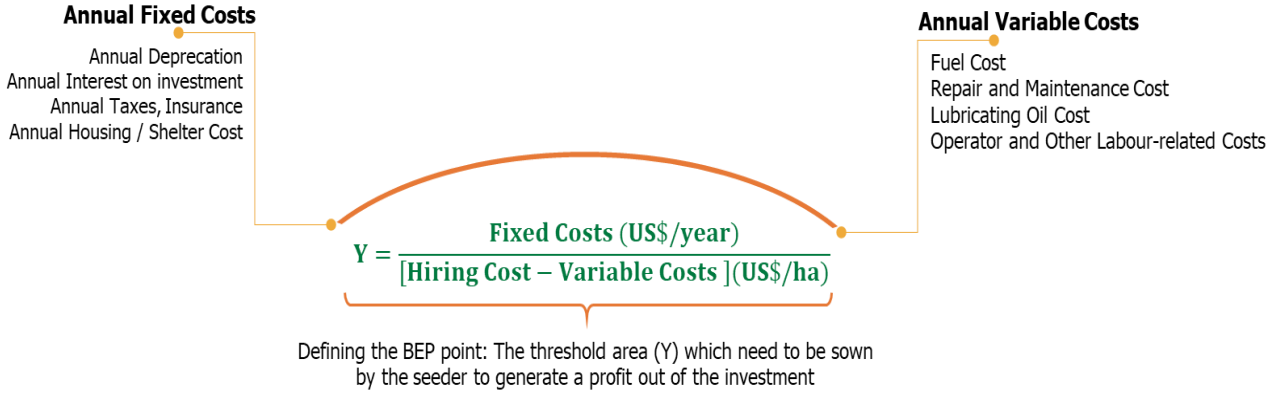

Figure 1. Operation Costs & BEP Calculation (Formula)

Depreciation is the amount by which value of the machine is decreasing through time. The annual depreciation value is calculated as follows:

$$D = \frac{P - S}{L}$$

Where, D = Yearly depreciation; P = Purchase price of machine (US$); S = Salvage value or the selling price of the machine after its useful life (US$); L = Useful life of the machine between buying and selling (years or hours).

BEP is the point at which the total revenue is exactly equal to the total costs. At this point no profit is made and no losses are incurred. BEP can be expressed in terms of sales i.e. it represents the number of units required to cover the costs. In our case, this represents the number of hectares ploughed by the purchased seeder. Areas ploughed above that BEP number results in profit while areas below it would result in a loss. Once this point is achieved (Y=1), the profit would be equal to the difference in the hiring price and the variable cost. The BEP threshold (Y) is calculated in terms of fixed costs, variable costs and hiring charges (Figure 1).

Reference

Zied Idoudi, Nasreddine Louahdi, Mina Devkota Wasti, Zahra Djender, Aymen Frija, Mourad Rekik. (26/4/2020). Public-Private Partnership for enhanced conservation agriculture practices: the case of Boudour Zero-Till seeder in Algeria. Lebanon: International Center for Agricultural Research in the Dry Areas (ICARDA). https://hdl.handle.net/20.500.11766/11047

Contact

Mrs. Zohra Ghalem Djender, Agricultural Economist – Head of Planning & Studies Department – ITGC, Algiers – Algeria. zdjen@hotmail.com

Mr. Nasreddine Louahdi, Agricultural Machinist – Director of ITGC Setif, Setif – Algeria. n.louahdi@gmail.com

Mr. Zied Idoudi, Technology Scaling Specialist – ICARDA. Zied.aidoudi@yahoo.com

Dr. Boubaker Dhehibi, Natural Resources Economist – ICARDA. b.dhehibi@cgiar.org

Dr. Aymen Frija, Agricultural Economist (Economic Modeling) – ICARDA. a.frija@cgiar.org

Dr. Mourad Rekik, Livestock Scientist – ICARDA. m.rekik@cgiar.org

II. Financial Viability Assessment

Results of the ZT "Boudour" Seeder BEP calculations under both subsidy scenarios are displayed in Table 1.

Table 1. Profitability and Financial Assessment for the Seeder Use

Operation	30% Subsidy	40% Subsidy	Tractor
Resale Value (US$)	11,372.093	11,372,093	31,744.186
Purchase Cost (US$) (Without Subsidy)	12,635.659	12,635.659	35,271.318
Purchase Cost (US$)	8,844.961	7,581.395	24,689.922
Estimated Life	15	15	20
Estimated Salvage Value (US$)	576,186	540.174	1,608.372
Interest Rate	0.057	0.057	0.057
Labour Setif and M'Sila (US$/day)	15.504	15.504	19.380
Time of Labour (hour/ha)	1	1	1
Renting Seeder Cost (US$/ha)	34.884	34.884	34.884
Ownership Costs			
Depreciation (US$)	808.682	808.682	-
Opportunity Capital Cost (US$)	576.186	540.174	1,608.372
Shedding Cost (US$)	186.046	186.046	186.046
Insurance Cost (US$)	62.015	62.015	77.519
Total Fixed Costs (US$)	**824.248**	**788.236**	**1,871.937**
Operational Costs			
Fuel (US$)	0	0	8.930
Reparations (US$)	38.759	38.759	77.519
Labour (US$)	775.194	775.194	775.194
Total Variables Costs (US$)	**813.953**	**813.953**	**861.643**
Total Costs (Fixed + Variables) (US$)	1,638.201	1,602.189	2,733.580
Estimated Annual Usage (hour)	400	400	400
Estimated Annual Usage (ha)	400	400	400
Total Operating Cost per ha (US$/ha)	4.095	4.005	6.834
Total Variable Cost (US$)	2.035	2.035	2.154
Total Variable Cost of Seeding per hour (US$/hour)	6.040	6.040	8.988
Break Even Point (ha)	**31.68**	**30.29**	

Source: Algerian CLCA Team, 2020.