ACIAR project north Africa CSE-2011-025
Adapting conservation agriculture for rapid adoption
by smallholder farmers in north Africa

Report on zero-till seeder international inventory and recommendations
for purchase under objective 2.1.1.

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Laouar Abdelmalek (ITGC Setif, Algeria)

A) Rationale behind objective 2.1.1:
Many imported zero-till (ZT) seeders - mainly disc drills - originating from Europe and north America, are sold in the region at very high prices (US$30-55k). Recently, some intermediate priced ZT tine seeders, within a US$20-25k price bracket, are being imported into the region from Spain. The search for simpler, smaller and lower cost seeders is a priority for the project to facilitate access to affordable technologies. Evaluation to date of very low cost seeders from Syria (US$3k + freight) showed an attractive potential for their simplicity and relative performance, but also highlighted some limitations, some of which can prove a significant disincentive to adoption.

A suitable commercial ZT seeder for purchase as part of the project objective 2.1.1 strategy is intended to provide measurable improvements upon the performance limitations observed during testing to date of the basic Syrian ZT seeders.

Selection criteria for suitable commercial ZT seeders were identified and prioritised as follows:
  i) Preferred price: up to approx. US$10,000 in country
  ii) Power source: suitable for 65-70 HP tractors
  iii) Seeder width: 2-2.3m preferred range
  iv) Specifications: simple tine seeding system, 3 point linkage, 20-25cm row spacing range, dual seed/fert hopper, metering suitable for a range of winter crops, simple covering device with option for press wheels preferable.

The sought out improvements in performance may include the following considerations:
  • contour following ability to improve the uniformity of crop establishment in poorly prepared and undulating land,
  • residue handling capacity to improve the ability to establish crops in heavier residue with minimal clumping and/or seeder blockage,
  • wear resistance of the furrow openers to maintain performance over time in harsh soil conditions,
  • separate seed and fertiliser banding ability to enable safe in-furrow fertiliser placement in higher input regions,
  • manufacturing quality and strength to enable accurate and repeatable settings as required, safe and practical functionality, and overall improved longevity and reliability,
• performance in sticky conditions enabling timely seeding and improved crop establishment efficiency,
• performance in marginal moisture situations improving crop establishment efficiency with the use of moisture delving openers and water harvesting press wheel furrows.

B) **Commercial ZT seeder identification**

Over the last 6 months, limited suitable commercial ZT tine seeders were found within the targeted price range. Some lower cost ZT seeder versions (<$10k) have poorly defined specifications which do not fully meet the targeted specifications, or are at a prototype or early commercialisation stage. Several suitable commercial ZT seeders have been identified in the $11-14k price range, mostly due to exceptional discounts negotiated with the suppliers. Some suitable ZT seeders currently being developed as part of the ACIAR Iraq project would fall within a suitable price bracket (US$7,000) and are anticipated to become commercially available in the next 6 months. The list of identified seeders to date and their key specifications are displayed in appendix A.

C) **Commercial ZT seeder selection approach:**

The decision to purchase some of these identified seeders as part of objective 2.1.1. may be approached in two ways, namely:

i) **Price focus:** These imported ZT seeders, once successfully evaluated, would become a commercial reality directly supporting the adoption aims of the project. In this case, it is important to ensure the likely recommended retail price to the farmer falls within a realistic bracket range accessible to those most likely interested in their purchase. At the moment, a US$10,000 ceiling for purchase in country has been a guiding value for selecting potential seeders, but this has placed constraints on seeder suitability. It is recommended to assess if a higher price reference would be realistic in light of the farmer mechanisation survey component conducted under Objective 1.1.

ii) **Technology focus:** These imported ZT seeders, once successfully evaluated, would provide a technical benchmark and some guidance to assist the development and improvement of locally produced ZT seeders under Objectives 2.1.3. In this case, the ZT seeder purchase (one-off) cost would be less critical than their technical suitability, i.e. seeking a high likelihood of delivering improvements over some of the observed Syrian seeder limitations in each local environment. This approach would aim to influence the local development of better performing and better adapted ZT seeders.

Commercial ZT seeders which can especially fulfil both the above focus areas would be a priority for purchase in the project.
### D) ZT seeder comparative analysis:

<table>
<thead>
<tr>
<th>#</th>
<th>3 PL seeder key features</th>
<th>Approx. US$ price tag (Maghreb)</th>
<th>Relative benefits*</th>
<th>Relative disadvantages*</th>
<th>notes</th>
</tr>
</thead>
</table>
| 1  | **John Shearer Ltd**  
10 row - 2.3m  
Approx 700kg  
AUSTRALIA | Discounted prices:  
$13.4k (1 unit)  
$12.5k (3 units)  
$11.5k (5+ units)  
+ freight | • Quality of manufacture  
• Access to large range of Australian seeding system technologies (e.g. long life furrow openers, separate seed/fert banding, press-wheels, press-coils etc...)  
• Discount price structure remains valid for interested retailers | • Recommended retail price (RRP) higher than targeted  
• Press-wheels not included | Manufacturing delay (4-6 weeks)  
Pricing may reduce slightly on larger quantities  
20ft container freight from Adelaide at US$3-3.5k |
| 2  | **National Agro-Industries**  
10 rows – 2.5m  
Approx. 800kg  
INDIA | Approx. $7k  
+ freight | • Cost inclusive of press-wheels and within target price range | • 2 prototypes made, non commercialised yet  
• Quality unproven  
• Limited hopper capacity | Price to be re-confirmed upon firm quote and final specifications  
Some specifications can be adapted |
| 3  | **Julio GIL S.A.**  
10 rows 2.1m  
Approx. 800kg  
SPAIN | Discounted price:  
Approx. $10.6-11k  
(1+ unit)  
Freight included to Tunis | • Cost is acceptable and inclusive of press wheels  
• Quality is known and locally accepted (Tunisia) | • Single choice tine seeding system  
• RRP to the farmer is unknown (likely around US$15-16k) | Importer is a keen partner wanting to participate in the project  
Cost to Algeria/Morocco to be negotiated |
| 4  | **ATMAR-INRA**  
Moroccan Seeder  
10 rows - 2.3m  
Approx. 1050kg  
MOROCCO | Approx. price $10.5k  
+ freight | • Cost is close to bracket range and inclusive of press wheels  
• Contour following benefits in undulating land | • Very heavy for 3PL seeder  
• Seeder is at an early commercialisation stage  
• Some design issues still being worked on | Wider row spacing (e.g. 9 rows at 25cm) would decrease cost and weight, to be negotiated with manufacturer |
<table>
<thead>
<tr>
<th>#</th>
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<th>Approx. $ price tag (Maghreb)</th>
<th>Relative benefits*</th>
<th>Relative disadvantages*</th>
<th>notes</th>
</tr>
</thead>
</table>
| 5 | Agrowplow Agrow-seeder 8 row – 2m | Discounted price: $10.7k + freight | • Quality of manufacture  
• Access to large range of Australian seeding system technologies (e.g. long life furrow openers, separate seed/fert banding, press-wheels, press-coils etc...)  
• Discount price structure remains valid for interested retailers | • Single hopper seeder (!!)  
• Simple spring coil seeding tine technology | Pricing may reduce slightly on quantities  
Freight cost to be confirmed |
| 6 | Rama Manufacturing 10 row ZT seeder 10 rows – 2.3m | $7k + freight | • Cost inclusive of press-wheels and within target price range | • Quality variable  
• Prototype stage with commercialisation expected within the next 6 months | Australian style technology manufactured in Jordan  
Pricing to be confirmed at time of order |
| 7 | Hebei NAM Group 2BMGF-7/14 14 rows-2.24m | $2k + freight | • Very low cost unit (!)  
• Not residue limited | • Quality unknown  
• Rotary tilling is full soil disturbance  
• Small capacity hoppers  
• Not suited to fragile structured and stony soils | Price to be confirmed at time of ordering  
May suit small scale intensive (higher rainfall or irrigated) cropping |
| 8 | Altinöz TM Ltd Sti Paired row ZT seeder 9 rows – 2.1m Approx. 950 kg tbc | $9.8k + freight | • Paired row seeding  
• Quality of manufacture  
• Heavy duty frame | • Heavy seeder  
• Poor tine break-out characteristics | Price can reduce with no-marker arms  
Company very cooperating and can design and manufacture to specifications  
Tine design may be changeable? |
| 9 | AgriPak international ZT seeder 16 rows – 2.7m | $6.5k in Algeria | • Low cost unit  
• Currently imported and available in Algeria  
• Suited to smaller tractors | • Quality unknown  
• Light-duty manufacturing  
• Limited residue handling and hopper capacity | Algerian importer not keen in sharing information |

* beyond the main specifications which may be met
E) **Recommendations for ZT seeder purchase:**

- The capital purchase budget for ZT seeders allocated per country is AUD30,000
- The use of this budget can be maximised by grouping purchases and deliveries where applicable.
- The use of the budget may also be split over time to maximise access to the most fitting technologies, should time be a critical factor. (e.g. access to Lower cost Rama ZT seeders in due course ?)
- Because of the price compromise from the initial budgeted values (AUD10k = US$9k per seeder in country), 2 - rather than 3 – commercial ZT seeders may be purchased for each country. The complement in budget may be allocated to specific seeding system technologies to diversify.

**Proposed seeder options:**

<table>
<thead>
<tr>
<th>Seeder</th>
<th>units</th>
<th>Reasoning for purchase</th>
<th>Approx. cost (tbc.)</th>
<th>Partner countries</th>
</tr>
</thead>
<tbody>
<tr>
<td>GIL (Spain)</td>
<td>3</td>
<td>• Affordable and available in Tunisia by late Sept-early October deadline (NB: order to be placed before end of July)</td>
<td>$10.6-11k</td>
<td>Tunisia,</td>
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<tr>
<td></td>
<td></td>
<td>• Regional supplier already known and respected,</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>• Quality manufacturing</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Commercial-ready ZT seeder option</td>
<td></td>
<td></td>
</tr>
<tr>
<td>John Shearer (Australia)</td>
<td>3</td>
<td>• Access to Australian seeding system technologies, tailored to each platform on each seeder (e.g. sticky soils, furrow sowing, separate seed/fertiliser banding)</td>
<td>$12.5k + options + seeding system accessories + freight</td>
<td>Tunisia, Algeria, Morocco</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Commercial-ready option</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>• Quality manufacturing</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>• Delivery possible in October NB: Order to be confirmed by end of July – up to 6 weeks to dispatch + 6 weeks freight expected.</td>
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</tbody>
</table>

Note: Main reasons for discarding other seeders:
- Technologies not commercial-ready or not fully proven
- Compromise on targeted seeder specifications is too great (e.g. quality, weight, single hopper)

**Plan of action:**

1. Project machinery teams to review the attached and comment on the most fitting ZT seeders, considering the information presented
2. Machinery team to agree and endorse a common purchase plan and formalise a recommendation to project committee/ICARDA - DEADLINE: 18 July 2013
3. ICARDA to confirm and follow-up the equipment purchase with the relevant suppliers: DEADLINE: 26 July 2013
4. UniSA to liaise and facilitate any Australian purchase (if relevant)
5. INGC to liaise and facilitate GIL seeder purchase (if relevant)
Appendix A:

Identified ZT seeders to date (6 July 2013) for consideration by the project

<table>
<thead>
<tr>
<th></th>
<th>Company Name</th>
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<td>i)</td>
<td>John Shearer Ltd, Australia</td>
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<td>ii)</td>
<td>National Agro-Industries, India</td>
<td>8</td>
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<tr>
<td>iii)</td>
<td>Julio Gil Águeda e Hijos, S.A., Spain</td>
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<td>iv)</td>
<td>ATMAR-INRA, Morocco</td>
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<td>v)</td>
<td>Agrowplow Soil Care Systems International Pty Ltd, Australia</td>
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<td>vi)</td>
<td>Rama manufacturing, Jordan</td>
<td>12</td>
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<tr>
<td>vii)</td>
<td>Hebei Nonghaha Agricultural Machinery Group Co., LTD, China</td>
<td>13</td>
</tr>
<tr>
<td>viii)</td>
<td>ALTINÖZ Tarim Makinalari Ltd Sti, Turkey</td>
<td>14</td>
</tr>
</tbody>
</table>
(ix) | AgriPak International, Pakistan                 | 15   |
Seeder specification form I

Brand name: John Shearer Ltd
Model: 13R PTD modified with 10 row hopper
Country of manufacture: Australia
Factory address: 472 Share Street, Kilkenny SA 5009 Australia
Tel: +61 (0) 88268 9555 ext 313
Email: franco@johnshearer.com.au
Contact: Franco Perrotta - Operations Manager
Website: www.johnshearer.com.au

Key criteria:
indicative discounted price ex-works: (AUD1=US$0.9) RRP
US$19,200 – discounted 30% to project US$13,430 (1 unit)
US$12,470 (3 units), US$11,500 (5+ units per country) –
price structure remains valid for future resellers
Tractor horsepower range: 50-60 HP
Seeding width: 2.3m

Selected specifications

A) FRAME
Seeder hitch: 3PL (cat 2)
Seeder weight (empty): expected around 700kg
Transport width: tbc. (approx. 2.8-2.9m tbc)

B) HOPPERS
Hopper: double
Capacity: seeds: 160kg - fertilizer: 220kg

C) SEEDING SYSTEM:
Tine opener: 620 tine double spring - unequipped
Row spacing: 23 cm adjustable within frame constraints
Number of openers: 10
Number of ranks: 3 Distance between ranks: 55cm tbc.

D) METERING SYSTEM:
Roller type: non-adjustable fluted (seeds) - peg tooth (fert)
Adjustment means: 31 speed gear box, sprockets, roller flap
Range of crops sown:
  - Small seeds: canola, rye grass
  - Medium seeds: cereals
  - Large seeds: peas, lupins
Seed rate min-max (wheat reference): tbc. kg/ha

E) OPTIONS AVAILABLE (extra cost):
Press wheels: Y details: RRP US$1100 low mount tool bar for press wheels if needed
Disc coulters Y details: available on request.

Notes: Optional extras: opener + seed banding boots (e.g. pic), hopper 150mm raising spacer,
fertiliser hopper screen, electronic hectaremeter, large seed metering roller, separate seed/fertiliser
banding, discount applies on spare parts and options, expected freight from Australia: US$3-3.5k
per 20ft container
Seeder specification form II

Brand name: National Agro-Industries
Model: 10 row spring tine press wheel ZT drill
Country of manufacture: India (Punjab)
Factory address: Link Road, Industrial Area “A”, Ludhiana – 141003 (INDIA)
Tel: +91 98150-64000
Email: sales@nationalagro.com
Contact: Mr Rajdeep Singh – Marketing Manager
Website: www.nationalagroinds.com

Key criteria:
Indicative cost ex-works: US$ $7,000 tbc.
Tractor horsepower range: 60-70 HP
Seeding width: 2.5m

Selected specifications

A) FRAME
Seeder hitch: 3PL (cat 2)
Seeder weight (empty): expected around 800kg
Transport width: 2.55m

B) HOPPERS
Hopper: double
Capacity (L): seeds: tbc  fertilizer: tbc

C) SEEDING SYSTEM:
Tine opener: spring loaded 100-200kg break out adjustable – NAI baker point opener
Row spacing: 25cm (adjustable ?) Y
Number of openers: 10
Number of ranks: 3  Distance between ranks: tbc

D) METERING SYSTEM:
Roller type: adjustable fluted (Aluminium seeds – cast iron fertiliser)
Adjustment means: lever and manual sprocket gear box
Range of crops sown:
  - Small seeds: tbc
  - Medium seeds: cereals, rice,
  - Large seeds: peas, lupins, small beans
Seed rate min-max (wheat reference): 10-250* kg/ha

E) OPTIONS AVAILABLE:
Press wheels: Y  details: included
Disc coulters N  details:

Notes: Prototype drill to date only - expected freight from India: tbc. – lower cost option with no press wheels
Seeder specification form III

Brand name: Julio Gil Águeda e Hijos, S.A.
Model: purpose made model SANL 10
Country of manufacture: Spain
Factory address: Ctra de Alcalá-Torrelaguna, Km10, 128814 Daganzo de Arriba, Madrid
Tel: +34 9188454 29/49
Email: ventas@sembradorasgil.com
Contact: Ets JOUNI MED & CIE, Tunis
Tél: +216 71 334 900 - email: etab.jouini@planet.tn
Website: www.sembradorasgil.com

Key criteria:
Indicative cost (Tunis): one-off discounting - US$ 10,600
(US$1 = TND1.68)
Tractor horsepower range: 60-70 HP
Seeding width: 2.1m

Selected specifications

A) FRAME
Seeder hitch: 3PL (cat 2)
Seeder weight (empty): expected around 800kg
Transport width: 2.3m

B) HOPPERS
Hopper: double
Capacity (L): seeds: 400 fertiliser: 300

C) SEEDING SYSTEM:
Tine opener: spring loaded break out adjustable – Inverted T cast opener
Row spacing: 21cm - adjustable within frame constraints
Number of openers: 10
Number of ranks: 3 Distance between ranks: tbc

D) METERING SYSTEM:
Roller type: peg tooth (seed and fertiliser)
Adjustment means: gear box
Range of crops sown:
  Small seeds: tbc
  Medium seeds: cereals,
  Large seeds: peas, lupins, small beans tbc.
Seed rate min-max (wheat reference): tbc.

E) OPTIONS AVAILABLE:
Press wheels: Y details: included in price
Disc coulters N details:
Notes: Special price for project - RRP unknown as special unit for the project, For info: SANL-19 (3.0m) approx.
US$20,200 RRP - no press wheels
Seeder specification form IV

Brand name: **ATMAR-INRA**
Model: Moroccan ZT seeder (10 row modified model)
Country of manufacture: Morocco
Factory address: i) C/- INRA CRRA workshop, Settat, BP:589, 26000, Morocco ii) ATMAR, 20 Charii El Fadila, BP31 Rabat, Morocco
Tel: +212 537 794063 / +212 537 794063
Email: oelgharras@yahoo.com ; info@atmar.ma
Contact: Mr Oussama El-Gharras, Moroccan seeder Operations Manager, INRA CRRA Settat ; Mr Mohamed Idrissi, Director, ATMAR, Rabat
Website: [www.inra.org.ma](http://www.inra.org.ma) ; [www.atmar.ma](http://www.atmar.ma)

**Key criteria:**
Indicative cost (ex-works): approx. US$10,500
Tractor horsepower range: 85-90 HP
Seeding width: 2.3m

**A) FRAME**
Seeder hitch: 3PL (cat 2)
Seeder weight (empty): expected around 1050kg.
Transport width: 3.0 m.

**B) HOPPERS**
Hopper: double
Capacity (L): seeds: 350 , fertilizer: 450

**C) SEEDING SYSTEM:**
Disc coulter + seeding tine opener: contour following row units
Row spacing: 23 cm - not adjustable
Number of openers: 10
Number of ranks: 2 Distance between ranks: n/a

**D) METERING SYSTEM:**
Roller type: adjustable fluted (seed and fertiliser)
Adjustment means: lever
Range of crops sown:
  - Small seeds: canola
  - Medium seeds: cereals,
  - Large seeds: peas, lupins.
Seed rate min-max (wheat reference): 60 – 200 kg/ha.

**E) OPTIONS AVAILABLE):**
Press wheels: Y details: included
Disc coulters Y details: included

Notes: Price/weight tbc. as model is slightly modified from previous versions – Moroccan seeder design still evolving and seeder is at an early commercialisation stage.
Seeder specification form V

Brand name: **Agrowplow Soil Care Systems International Pty Ltd**
Model: Agro-seeder 8 rows
Country of manufacture: Australia
Factory address: 134 Thornton Street – Wellington NSW 2820 - Australia
Tel: +61 (0) 26845 1566
Email: wade@agrowplow.com
Contact: Wade Smith - General Manager
Website: [www.agrowplow.com](http://www.agrowplow.com)

**Key criteria:**
Indicative discounted price ex-works: (AUD1=US$0.9) RRP US$15,330 – discounted 30% to project as US$10,730 - price structure remains valid for future resellers (large qty to be negotiated)
Tractor horsepower range: 50-60 HP
Seeding width: 2m

**A) FRAME**
Seeder hitch: 3PL (cat 2)
Seeder weight (empty): expected around 600kg
Transport width: 1.9m

**B) HOPPERS**
Hopper: single (10 outlet)
Capacity: seeds: 205L - fertilizer: n/a

**C) SEEDING SYSTEM:**
Tine opener: spring coil tine – range of openers available
Row spacing: 25 cm adjustable within frame constraints
Number of openers: 8
Number of ranks: 3 Distance between ranks: 45cm

**D) METERING SYSTEM:**
Roller type: fluted
Adjustment means: speed gear box, gate flap
Range of crops sown:
  - Small seeds: canola, rye grass
  - Medium seeds: cereals
  - Large seeds: peas, lupins
Seed rate min-max (wheat reference): tbc. kg/ha

**E) OPTIONS AVAILABLE** (extra cost):
Press wheels: Y details: Primary Sales Australia - included in price
Disc coulters N details:

**Notes:** SINGLE BOX seeder only (no separate fertiliser box), reduced price with no press wheels
Expected freight from Australia: US$3-3.5k per 20ft container (tbc.)
Seeder specification form VI

Brand name: Rama Agricultural Equipment manufacturing
Model: 9-10 row ZT seeder
Country of manufacture: Jordan
Factory address: Az-Zarqa free zone ; Amman, Jordan
Tel: +962 53826007
Email: thaer.nimer@ramajordan.com
Contact: Mr Thaer Al Nimer – Business Dev. Manager
Website: www.ramajordan.com

Key criteria:
Indicative cost ex-works: $6,500-7,000
Tractor horsepower range: 65-75 HP
Seeding width: 2.3m (approx.)

Selected specifications

A) FRAME
Seeder hitch: 3PL (cat 2)
Seeder weight (empty): expected around 750kg
Transport width: 2.9m

B) HOPPERS
Hopper: Double
Capacity: seeds: ??L - fertilizer: ??L

C) SEEDING SYSTEM:
Tine opener: spring tine adjustable break-out up to 90kgf–range of openers can be fitted
Row spacing: 23 (25) cm adjustable within frame constraints
Number of openers: 10 (9)
Number of ranks: 3 Distance between ranks: 42-47cm

D) METERING SYSTEM:
Roller type: peg tooth (seeds/fertiliser)
Adjustment means: 21 speed gear box, roller flap
Range of crops sown:
  Small seeds: canola, rye grass
  Medium seeds: cereals
  Large seeds: peas, lupins
Seed rate min-max (wheat reference): tbc. kg/ha

E) OPTIONS AVAILABLE (extra cost):
Press wheels: Y details: walking beam type dual wheels
Disc coulters N details:

Notes: First prototype tested in Sept 2013, Early commercialisation (x12 units) in Iraq during Oct-November – Photos of press wheels are from a larger trailed model (November 2012) prototype.
Seeder specification form VII

Brand name: Hebei Nonghaha Agricultural Machinery Group Co., LTD
Model: 2BMGF-7/14 no-tillage wheat seeder
Country of manufacture: China
Factory address: Shenze Industrial Park, East rd. of Beihuan, Shenze County, Shijiazhuang City, Hebei Province, China, 052560
Tel: +86-0311-83520325
Email: nhhwzy@qq.com
Contact: Mr. ZhiYong Wang
Website: http://nonghaha.en.alibaba.com/

Key criteria:
Indicative cost ex-works: = $2,000 (CNY6.1 = US$1) tbc.
Tractor horsepower range: 80-100 HP
Seeding width: 2.24m

Selected specifications

A) FRAME
Seeder hitch: 3PL (cat 2)
Seeder weight (empty): expected around 630kg
Transport width: 2.44m

B) HOPPERS
Hopper: Double
Capacity: seeds: 100L - fertilizer: 100L

C) SEEDING SYSTEM:
Rotary tiller 60 blades – 300 rpm – 10cm tilling depth
Row spacing: 10-22 cm adjustable
Number of rows: 14 seed rows / 7 fertiliser rows
Number of ranks: 1 Distance between ranks: n/a

D) METERING SYSTEM:
Roller type: fluted (seeds/fertiliser)
Adjustment means: screw dial
Range of crops sown:
   Small seeds: tbc.
   Medium seeds: wheat
   Large seeds: tbc.
Seed rate min-max (wheat reference): up to 450 kg/ha

E) OPTIONS AVAILABLE (extra cost):
Press wheels: Y details: included in price planar or wavelike press wheels
Disc coulters N details:
Notes: Price to be confirmed. Sowing depth 3-5cm, fertilizer to seed separation 5cm. NB: Cereals ZT drills not found in China except as powered till drills. Tine planters exist for wide row crops.
Seeder specification form VIII

Brand name: ALTINÖZ Tarim Makinalari Ltd Sti
Model: 2013
Country of manufacture: Turkey
Factory address: Akeller Cad. No:114
Söke/Aydın/TURKEY
Tel: +90 256 518 14 91 (Pbx)
Email: info@altinozltd.com
Internet: www.altinozltd.com
Contact: Mr Ziya ALTINÖZ – General Manager

Key criteria:
Indicative cost ex-works: = US$9,850
Tractor horsepower range: 70-80HP
Seeding width: 2.07m

Selected specifications

A) FRAME
Seeder hitch: 3PL (cat 1-2)
Seeder weight (empty): around 950kg
Transport width: 2.1m

B) HOPPERS
Hopper: Double
Capacity: seeds: 190L - fertilizer: 210L

C) SEEDING SYSTEM:
Tine opener, paired row seeding
Row spacing: approx 23cm
Number of rows: 9 seed rows
Number of ranks: 2  Distance between ranks: 63cm
Frame: 120x120x5mm tube

D) METERING SYSTEM:
Roller type: peg tooth (seed/fertiliser)
Adjustment means: gear box
Range of crops sown:
  - Small seeds: canola
  - Medium seeds: Wheat, barley
  - Large seeds: peas
Seed rate min-max (wheat reference): up to 350kg/ha

E) OPTIONS AVAILABLE (extra cost?):
Press wheels: N  details:
Disc coulters: N  details:
Notes: Optional Chain systems behind tines for covering the seeds, marker arms included. Seeder designed to suit requirements.
Seeder specification form IX

Brand name: Agripak International
Model: 16 row ZT seeder
Country of manufacture: Pakistan
Factory address: 5 Amber Palace, Main Shahra-e-Faisal, Adjacent to FTC Building, Karachi. PAKISTAN
Importer C/- Eurl MOTAL, cite Bel Air lotissment 252 n°67 19000 Setif Algeria (Mr Salah Righi +213 3691 2626 / 661 350661)
Website: www.agripak.com.pk
Email: info@agripak.com.pk
Contact: +92-213-4324661-4

Key criteria:
Indicative cost (RRP Algeria): US$6,500 tbc.
Tractor horsepower range: 55-70 HP
Seeding width: 2.72m (tbc)

Selected specifications

A) FRAME
 Seeder hitch: 3PL (cat 2)
 Seeder weight (empty): ??kg
 Transport width: 3m (tbc)

B) HOPPERS
 Hopper: Double
 Capacity: seeds: ??L - fertilizer: ??L

C) SEEDING SYSTEM:
 Tine opener: rigid tine – caldow point style
 Row spacing: 15-17cm?? adjustable within frame constraints
 Number of openers: 16
 Number of ranks: 2   Distance between ranks: ??cm

D) METERING SYSTEM:
 Roller type: adjustable fluted (seeds/fertiliser)
 Adjustment means: lever
 Range of crops sown:
   Small seeds: ??
   Medium seeds: cereals
   Large seeds: ??
 Seed rate min-max (wheat reference): tbc. kg/ha

E) OPTIONS AVAILABLE (extra cost):
 Press wheels: N   details:
 Disc coulters N   details:
 Notes: Little data given, low residue clearance machine, light duty manufacture, adjustable gauge wheels x2 separate from ground drive gauge wheels x2