

## Economic prospects and current situation of the planter manufacturing industry in Mexico

By Jaime Cuauhtemoc NEGRETE<sup>†</sup>

**Abstract.** Mexico imports 14 million pesos in seeders of which 53% is from the United States, 16.6% from France, 11.4 from Italy, 8.7 from Brazil, 5.5% from Spain and 4.7% from others countries. Donoso 2007. It is estimated that there is a market of Seeders of about 3,000 machines/year. About 1800 imported and another 1200 of national manufacture, of them 500 of Direct Sowing approximately. The objective of this work is to analyze the situation of the planter manufacturing industry and its economic prospects for the future in Mexico. Mexico in the segment of planters unlike the segments of tractors and combine harvesters, in which in the first only meet manufacturers and in the second it does not even exist in the country, has a national industry of manufacturing of planters strongly rooted in the country with its own technology. This situation was evidenced by not allowing the emergence of Argentine planters, as well as infrastructure to continue the research and development of new designs of seeders in the four agricultural institutions led by the Universidad Autonoma Chapingo. It must be invested in Precision Agriculture technology With seeders with intelligent metering so as not to be left behind this industry. If this condition is put into practice the economic outlook is very encouraging for this segment of the national agricultural machinery industry.

**Keywords.** Seeders, Planters industry, Mexico, Agricultural machines, Manufacturing.

**JEL.** J43, Q01, Q13, Q17.

### 1. Introduction

Mexico imports 14 million pesos in seeders of which 53% is from the United States, 16.6% from France, 11.4 from Italy, 8.7 from Brazil, 5.5% from Spain and 4.7% from others countries. Donoso 2007. It is estimated that there is a market of Seeders of about 3,000 machines/year. About 1800 imported and another 1200 of national manufacture, of them 500 of Direct Sowing approximately. Predominates the need for planter of coarse grain - conventional - and direct seeding of fine and coarse grain with fertilization. In Mexico, the production of seeders is mainly oriented to the domestic market, but sporadically they are exported. As in other markets, the segment of planters and agricultural implements has more local characteristics, with medium-sized manufacturers that also export and import. The number one seed vendor is Monosem (of French origin), with three-point machines and fertilization with pneumatics distribution. In Mexico, about 180 machines of this brand are sold per year. They are 2 and 4 rows and in a small scale the 6 rows. The price varies from 7000 \$ US, the two-row; To 13,000 the four-row. Another machine that has wide diffusion is the GEHO\_PRECISA of 4 pneumatic grooves with hoe or double disc. The most sold

<sup>†</sup> Agrarian Autonomous Antonio Narro University, Faculty of Agronomy Eliseu Maciel of UFPel, Brazil.



✉. temoneg@gmail.com

seed brands are: Monosem, Gheo, Terramac, Gallinagini, Sampopa, Dobladence, FAMAQ, etc. Bragachini (2011).

Seeders. They are machines designed to dispense a certain amount of seed and place them on the ground, according to a certain standard of distribution (Mialhe, 1996). They can be of direct or conventional seeding, fine or coarse grain, precision or bytrickle, mechanical or pneumatic. Optionally, they have single or double localized fertilization systems (solid or liquid) and/or application of pesticides (solids or liquids). With the diffusion of direct sowing, the work destined to the preparation of the seed bed, which is characteristic of the traditional method such as the primary plow and the mechanical control of weeds, was significantly reduced. Direct sowing, unlike the conventional system, requires seeders that allow to implant the crops in batches with surface stubble treated with agrochemicals. In this case, the planter deposits the seeds with the necessary fertilizer for their development in a narrow strip of soil prepared by a series of implements (chisels, discs and others) placed in front of the sowing bodies.

In turn, they can be of fine grain (wheat) or coarse (soybean and corn), depending on the size of the seed and its distribution in the land. The first ones deposit the seeds uniformly in line on the surface of the lot, for which they count with a hopper with dosage to trickle or of precision, whereas those of coarse grain distribute the seeds in rows with a certain distance of separation between them. The latter have individual seed bodies fed hoppers that dose the amount of seeds deposited in each row. The objective of this work is to analyze the situation of the planter manufacturing industry and its economic prospects for the future in Mexico.

A thorough search was carried out in databases internet of things, libraries, etc., in indexed journals, periodicals, and other available databases.

**Table 1.** Imports, exports of planters from 2000 to 2008. Own elaboration with data from FAOstat

| planters | imports | exports |
|----------|---------|---------|
| 2008     | 5541    | 96039   |
| 2007     | 15328   | 89262   |
| 2006     | 4718    | 119407  |
| 2005     | 4966    | 130412  |
| 2004     | 4030    | 72575   |
| 2003     | 2271    | 35974   |
| 2002     | 2296    |         |
| 2001     | 82206   |         |
| 2000     | 47993   |         |

## 2. Manufacture in the country

This is done without the participation of large brands, which is why Mexico should take advantage of this situation and develop the agricultural machinery industry in this sector, and strongly support the industries that are engaged in this, such as local manufacturers Of seeders that are 5 in the area of Bajío or center of the country, in addition to others in other regions of the country, among them produce about 1500 seeders of which a good amount are for Direct seeding.

The seeders that produce are all of 3 points, those of coarse grain with mechanical distributor and pneumatic of national origin. They are of 2 and 4 furrows to 80 cm with robust construction, with distributor of fertilizer to the broadcast and located. The fine-grained ones are crawling. The design technology is rudimentary, but the product is adapted to the conditions of production of the Bajío and to the idiosyncrasy of the local producer Bragachini (2011).

The companies that are dedicated to the production of seeders are the following; Dobladenses Seeders, It is a 100% Mexican company located in Manuel Doblado Gto. Of the manufacturer Gelario Preñado that at the beginning of 1976 begins with the manufacture of mills of nixtamal, and of grains, later it begins with the manufacture of disk plows, nevertheless to not having results it begins with the manufacture of seeders of corn what Is a success, and it was in 1979 when the

## Journal of Social and Administrative Sciences

machining of molds for seeders began, in 1980 the brand registration is acquired and an increase in demand is seen, so that there is a need to expand the small facilities that at that time worked for The first factory was inaugurated in 1985. In addition to the maize planters, we also manufacture plows, rakes, levelers, edgers, edgers, cultivators, in 1991 the first demonstrations are started, in direct sowing, redesigning The direct-seeding maize planter, and when it is decided to specialize in seeders, which in 1997 required more advanced technology and state-of-the-art equipment, it offers 4 models of traditional seeders, 7 direct mechanical and pneumatic seed models, fine grains Of direct sowing 3 models and of traditional sowing 2 models

**Del Bajío Seeders:** It is a 100% Mexican company located in Manuel Doblado Gto. Founded on November 9, 1999 by Baltasar Preciado dedicated to the manufacture of agricultural machinery of direct planting, started work in a temporary warehouse in the ranch Vallado de la Prisión, at the same time began the construction of a suitable factory, eleven people started Production and currently exceeds 190 elements

**Famaq Seeders:** The company began its work in the agricultural turnaround in 1994, in Pénjamo Gto by a group of visionary shareholders committed to their community and country. Led by Juan Carlos Diaz. At that time, the company used its productive capacity for the design and manufacture of agricultural implements. Currently FAMAQ is the only company in the republic that has certified seeders from OCIMA. It has 10 models of seeders of direct seeding as traditional, in mechanical and pneumatic models.

**NegreteSeeders Industries** of Mr. Manuel Negrete have their facilities in Pénjamo Gto. ZetaSeeders, S.a. De C.V. Manufacture of seeders for maize, sorghum and beans. Traditional seed drill, z-3000, zero tillage in Guadalajara, Jalisco

**Lucatero Seeders:** Owner Gabriel Lucatero Who makes seeders in Morelia, Michoacán. Vázquez Seeders and implements Factory.

It had its beginnings in the year of 1937. In Sonora state of Mexico at first it counted on only a blacksmith shop in charge of SR. Pedro Vázquez García. By the year 1950, the technology of the time that was implemented allowed the workshop to be possible to repair agricultural implements and, thanks to the momentum of agriculture in those years, the workshop grew to become a successful company itself That in the year of 1962 took the commercial name of Industrias Vázquez SA At that time, the company was attended and managed by Mr. Pedro Vázquez García and son. In 1967, the commercial success of the company in conjunction with the growing activity of the Yaqui Valley allowed the acquisition of a land located in Norman E. Borlaug # 5801 where later it was founded a plant of production of agricultural implements and parts of the company, Which increased the penetration and sales of the company allowing other members of the family Vázquez García to join the administration with what the commercial name of the company changed to what we all know today; Industrias Vázquez S.A. Of C.V. Manufactures wheat seeders and seeders of minimum tillage.

The prototype of a seeder for permanent beds that was developed in Mexico, is being manufactured in several workshops. The Vázquez seeder and implements plant is manufacturing the seeders following the recommendations of the International Maize and Wheat Improvement Center (CIMMYT) and is marketing them in the north of the Mexican Republic. There are also other companies that have shown interest and are developing their own versions.

### 3. Research on seeders

Also there are investigations in seeders made by different authors and institutions; in the Antonio Narro Agrarian Autonomous University has given impetus to research in the evaluation system of metering precision seed allows monitoring the quality and efficiency of metering mechanisms for service industry agricultural machinery as well as facilitate the teaching and research systems

varying doses of seeds, planting prescriptions changes (Campos, 2014). In the autonomous university chapingo has been given due importance to the design and innovation of seeders, as shown in the following table is the institution that most thesis design of seeders has.

**Table 2.** Bachelor's and master's thesis developed at UAAAN, UNAM, Autonomous Chapingo University and University of Guanajuato

|                                |                         |  |
|--------------------------------|-------------------------|--|
| Autonomous Chapingo University | Torres, 2015            | Intelligent Seed and Fertilizer Dosing System in Seeders-Fertilizers   |
| Autonomous Chapingo University | Perez, 2015             | Design of an air-assisted direct seed drill  |
| Autonomous Chapingo University | Rosales, 2015           | Design of a wheat planter coupled to a two wheels tractor  |
| Autonomous Chapingo University | Lopez, 2014             | Development and evaluation of a multi-purpose seeder operated by a two-wheeled tractor   |
| Autonomous Chapingo University | Fernandez, 2013         | Design of a stationary planter of garlic cloves ( <i>Allium sativum</i> ) with apex orientation                                |
| Autonomous Chapingo University | Flores, 2009            | Design of a mycorrhizal doser coupled to a mechanical seed drill   |
| Autonomous Chapingo University | Mendieta, 2009          | Corn seed metering mechanism or fertilizer for versatile sowing  |
| Autonomous Chapingo University | García, 2008            | Design of a pneumatic seed metering mechanism for double-row grain planting  |
| Autonomous Chapingo University | Sanvicent & Merino 2004 | Design of a fertilizer planter, pesticide applicator for conservation tillage  |
| Autonomous Chapingo University | Martínez, 2003          | Design of a sowing machine associated with animal traction (maize and bean)  |
| Autonomous Chapingo University | Balderas, 1995          | Design of a small-grain planter for the multi-plow   |
| Autonomous Chapingo University | Salazar, 1995           | Design of a bean planter ( <i>Phaseolus vulgaris</i> L.)   |
| Autonomous Chapingo University | Ramírez, 1994           | Design of a lentil planter for animal traction   |
| Autonomous Chapingo University | Martínez, 1993          | Design of a unit seed drill  |
| UAAAN                          | Reynolds, 2006          | Design of an intelligent pneumatic seed dosing system  |
| UAAAN                          | Segundo, 2004           | Design of an Intelligent Seed Dosing System, Based on the Use of Microcontrollers (Phase 1: Evaluation of Neumatic Dosifiers). |
| UAAAN                          | Santos, 1993            | Design, Construction and Evaluation of a Manually Arranged Vegetable Seeder  |
| UAAAN                          | Arellanes, 2006         | Redesign of a planter coupled to a two-wheeled tractor for walnut  |
| University of Guanajuato       | Prieto, 2015            | Design of a seed drill for granulated material   |
| University of Guanajuato       | Chavez, 2007            | Design of the drive system of a precision pneumatic seed drill for garlic  |
| University of Guanajuato       | Ferreya, 2001           | Design and construction of an amaranth planter coupled to an agricultural tractor  |
| University of Guanajuato       | Gomez, 1998             | Design, construction and testing of a prototype animal draft planter for intercropping   |
| University of Guanajuato       | Marquez, 1997           | Construction of a lentil planter for animal traction   |
| University of Guanajuato       | Venegas, 1987           | Adapting a seed drill to a high clearance two wheels tractor   |
| University of Guanajuato       | Palafox, 1987           | Design of a seeder for the tractor SIDENA 310  |
| UNAM                           | Torrez, 2000            | Design and construction of a portable maize seed drill   |
| UNAM                           | Olivera, 1982           | Design, construction and testing of a seed drill   |
| UNAM                           | Toro, 1986              | Design of a garlic planter   |

#### 4. Discussion

Here in this segment of capital goods whose useful life is approximately 20 years according to Lopez & Hetz (1998a) it is important to highlight the research work that is being carried out by a team of Argentine researchers led by the expert in precision agriculture Mario Bragachini and who has already Fruitful to get 3 Argentine companies to join to enter the Mexican market of seeders.

This team already identified the need for Mexican agriculture in; Seeders of Direct Seeding of 4 and 6 rows of drag to 76 cm with wheel adapted to the irrigation gauge by furrow 1.5 m, with fertilization and equipment of Precision Agriculture (variable dose). The companies are; Crucianelli or Metar SRL (Armstrong), Apache (Las Parejas) and VHB (Oncativo, Córdoba) which, from a strategic union, proposed the following objective: to design, manufacture and

export Direct Seeding equipment to compete with conventional seeders that exist in the Mexican market. There, the agricultural production units require machinery of smaller size than those that are manufactured for Argentine producers. The project is called "315", and aims to develop a seed drill with a working width of 3.15 meters and a smaller number of grooves, suitable for floors with unevenness such as those in Mexico. The equipment also has the technological contribution of the company Verium, which is dedicated to the equipment of variable seed metering mechanisms, finally developed the seed drill NSFS 2400. As far as the characteristics of the seed drill, besides being of three points, it presents / displays equipment developed for widths of Work up to 4,50 mts; Fulfills the functions of sowing, fertilization and refertilization; Possibility of lodging between 2 and 8 lines of planting; Can work in drag condition or coupled to a 3 point hitch; Suitable for the assembly of a tank for liquid fertilization, among others. Given the large structural differences and the regional disparity, which hinder the productivity of the sector, there are initiatives that increase the performance of farms and modernize the work processes, as the decapitalization of the countryside and in general of agriculture continues, With the polarization of capital by industry and commerce.

In order to carry out the above, it will be necessary to have new technology and capital goods such as agricultural machinery, because as Lavarello (2011) states, the persistence of the capital goods industry as a vector of diffusion of technical progress is The primary reason to promote it, for which we must establish strategies as are the manufacturers of Argentine planters to advance in the competitive globalized world today, in our case CIMMYT can coordinate the domestic manufacturers to strengthen in the Mexican market, As well as to make alliances with the Argentine manufacturers that are leaders in direct sowing at international level, in manufacturing of harvesters they have the experience of a century at the same time that the transnational companies, and in tractors they have the impetus of realizing alliances to remake its National manufacturing industry of tractors, since they have been together with Brazil in Latin America those who have had a local industry of manufacturing of tractors, at present Pauny and Agrinar make them in Argentina, later the same can be done for the other goods of capital in agriculture such as plows, harrows, sprays and other agricultural implements.

### 5. Conclusions

Mexico in the segment of planters unlike the segments of tractors and combine harvesters, in which in the first only meet manufacturers and in the second it does not even exist in the country, has a national industry of manufacturing of planters strongly rooted in the country with its own technology. This situation was evidenced by not allowing the emergence of Argentine planters, as well as infrastructure to continue the research and development of new designs of seeders in the four agricultural institutions led by the Autonomuos Chapingo University. It must be invested in Precision Agriculture technology With seeders with intelligent metering so as not to be left behind this industry. If this condition is put into practice the economic outlook is very encouraging for this segment of the national agricultural machinery industry.

References

- Arellanes, O.J.C. (2006). Rediseño de una sembradora mecánica acoplada a un motocultor para nogalL (UAAAN:DIV.-Ingenieria-Mecanico Agricola-Licenciatura).
- Bragachini, M. (2011). *Informe del viaje a México - Febrero de 2011* [Retrieved from].
- Balderas, S.F. (1995). Diseño de una sembradora de granos pequeños para el multiarado. Tesis (Ing. Mecánico Agrícola), UACH. Departamento de Ingeniería Mecánica Agrícola.
- Campos M.S.G., Cadena, Z.M., & Ramirez F.G. (2014). Desarrollo de Equipos, Sensores e Instrumentos para Agricultura de Precision y Labranza de Conservacion. Depto. de Maquinaria Agrícola. UAAAN. Mexico. [Retrieved from].
- Donoso, J. (2007). STRAT Consulting *Situación del sector de maquinaria agrícola en América Latina*. Rosario, Argentina. [Retrieved from].
- Chavez, E.E.P. (2007). Diseño del sistema de accionamiento de una sembradora neumática de precisión para ajo. Tesis Licenciatura Universidad de Guanajuato división de ciencias de la vida.
- Fernández, S.D. (2013). Diseño de una maquina sembradora estacionaria de dientes de ajo (*Allium sativum*) con orientación del ápice. Tesis (Ing. Mecánico Agrícola), UACH. Departamento de Ingeniería Mecánica Agrícola.
- Flores, L.D. (2009). Diseño de un dosificador de micorrizas acoplado a una sembradora mecánica, Tesis (Ing. Mecánico Agrícola), UACH. Departamento de Ingeniería Mecánica Agrícola
- Ferreira, J.J.S. (2001). Diseño y construcción de una sembradora de amaranto acoplada a un tractor agrícola. Tesis Licenciatura Universidad de Guanajuato división de ciencias de la vida
- García, G.R. (2008). Diseño de un dosificador neumático para la siembra de grano a doblehilera Tesis (Ing. Mecánico Agrícola), UACH. Departamento de Ingeniería Mecánica Agrícola
- Gomez, C.A. (1998). Diseño, construcción y pruebas de un prototipo de sembradora de tiro animal para cultivos intercalados. Tesis Licenciatura Universidad de Guanajuato división de ciencias de la vida
- INEGI. (2011). Revista del VIII censo Agrícola y Ganadero. [Retrieved from].
- López R.M., & Huenchullan, E.H. (1998a). Efectos del uso anual y del método de depreciación sobre los costos fijos de operación de un tractor, sembradora y cosechadora de granos. *Agro sur*, 26(2), 63-69.
- López, R.M., & Huenchullan, E.H. (1998b). Uso anual que justifica económicamente la propiedad de algunas máquinas agrícolas de alto precio. *Agro sur*, 26(2), 44-52. doi. [10.4206/agrosur.1998.v26n2-05](https://doi.org/10.4206/agrosur.1998.v26n2-05)
- Lavarello, P.J., & Goldstein E. (2011). Dinámicas heterogéneas en la industria de maquinaria agrícola Argentina, *Revista Problemas del Desarrollo*, 166(42), 85-109.
- Lopez, G.J.A. (2014). Desarrollo y evaluación de una sembradora multiuso-multicultivo accionada por un tractor de dos ruedas. Tesis (Maestro en Ingeniería Agrícola y Uso Integral del Agua) -- UACH. Posgrado en Ingeniería Agrícola y Uso Integral del Agua
- Martínez, H.R. (2003). Diseño de una sembradora de cultivos asociados de tracción animal (maíz y frijol) Tesis (Ing. Mecánico Agrícola), UACH. Departamento de Ingeniería Mecánica Agrícola.
- Martínez, J.R. (1993). Diseño de un dosificador para sembradora unitaria. Tesis (Ing. Mecánico Agrícola), UACH. Departamento de Ingeniería Mecánica Agrícola.
- Marquez, C.H. (1997). Construcción de una sembradora de lenteja para tracción animal. Tesis Licenciatura Universidad de Guanajuato división de ciencias de la vida. Tesis Licenciatura Universidad de Guanajuato división de ciencias de la vida
- Mialhe, L.G. (1996). Máquinas Agrícolas: ensaios & certificação. FEALQ. Piracicaba, SP. 772p.
- Mendieta, A.E. (2009). Dosificador de maíz o fertilizante para sembrador versátil Tesis (M.C. en Ingeniería Agrícola y Uso Integral del Agua), UACH. Departamento de Irrigación.
- Olivera, D.L.R. (1982). Diseño construcción y pruebas de una sembradora para semillas tesis. Ingeniero mecanico electricista UNAM, Facultad de Ingeniería
- Palafox, C.T. (1987). Diseño de una sembradora para el tractor SIDENA 310. Tesis Licenciatura Universidad de Guanajuato división de ciencias de la vida. Tesis Licenciatura Universidad de Guanajuato división de ciencias de la vida
- Perez, R.J.L. (2015). Diseño de una sembradora de siembra directa asistido por aire Tesis (Ing. Mecánico Agrícola), UACH. Departamento de Ingeniería Mecánica Agrícola.
- Prieto, G.A.C. (2015). Diseño de una sembradora para material granulado Tesis Licenciatura Universidad de Guanajuato división de ciencias de la vida
- Ramírez, O.M. (1994). Diseño de una sembradora de lenteja para tracción animal. Tesis (Ing. Mecánico Agrícola), UACH. Departamento de Ingeniería Mecánica Agrícola.
- Reynolds, C.M.A. (2006). Diseño de un sistema inteligente de dosificación neumático de semilla. Tesis maestría UAAAN. Mexico.
- Rosales, M.D.M. (2015). Diseño de una sembradora de de trigo acoplada a un minitractor. Tesis (Ing. Mecánico Agrícola), UACH. Departamento de Ingeniería Mecánica Agrícola
- Sanvicente, L.D., & Merino S.M. (2004). Diseño de una sembradora fertilizadora, aplicadora de plaguicidas para labranza de conservación Tesis (Ing. Mecánico Agrícola), UACH. Departamento de Ingeniería Mecánica Agrícola
- Salazar, V.P. (1995). Diseño de una sembradora de frijol (*Phaseolus vulgaris* L.), Tesis (Ing. Mecánico Agrícola), UACH. Departamento de Ingeniería Mecánica Agrícola

## Journal of Social and Administrative Sciences

- Santos, E.A. (1993). Diseño, Construcción y Evaluación de una Sembradora de Hortalizas Acondicionada manualmente (UAAAN:DIV.-Ingeniería-Mecánico Agrícola-Licenciatura).
- Segundo, R.G. (2004). Diseño de un sistema inteligente dosificador de semilla, basado en el uso de microcontroladores (FASEI: Evaluación de Dosificadores Neumáticos), (UAAAN:DIV.-Ingeniería-Mecánico Agrícola-Licenciatura).
- Torres, S.J. (2015). Sistema Inteligente de Dosificación de Semilla y Fertilizante en Sembradoras-Fertilizadoras. Tesis de Maestría, Universidad Autónoma Chapingo. México.
- Torrez, C.D. (2000). Diseño y construcción de una sembradora portátil para maíz/ tesis Maestría en Ingeniería (Mecánica) UNAM, Facultad de Ingeniería
- Toro, M.J.A. (1986). Diseño de una sembradora de ajo tesis Maestría en Ingeniería (Mecánica) UNAM, Facultad de Ingeniería
- Venegas J.C. (1987). Adaptación de una sembradora a un motocultor de alto despeje. Tesis Licenciatura Universidad de Guanajuato división de ciencias de la vida.



### Copyrights

Copyright for this article is retained by the author(s), with first publication rights granted to the journal. This is an open-access article distributed under the terms and conditions of the Creative Commons Attribution license (<http://creativecommons.org/licenses/by-nc/4.0>).

