

DESIGN AND DEVELOPMENT OF VACUUM CYLINDER METERING MECHANISM FOR PLANTING OF BOLD SEEDS

Priya Sinha* and Ajay Verma

*FAE, IGKV, Raipur

Received-09.07.2016, Revised-29.07.2016

Abstract: Groundnut, maize and pigeonpea are major bold seeds crop in India. Planting of these bold seeds is a very drudgery and time consuming operation. To address this issue, there is a need to design and develop the vacuum cylinder metering mechanism for planting of bold seeds like groundnut, maize and pigeonpea. The design of the seed metering cylinder (length 1630 mm and diameter 80 mm) was based on the physical property of the bold seeds. It was made of an M.S. sheet. Seeds are held to the metering hole of the cylinder by suction pressure. The size of circular metering orifice was kept as 2.5 mm. Total 54 orifices having same size was made on the seed metering cylinder at 9 different locations. Each location is having 6 orifices, at an angular distance of 60°. The vacuum rod and the metering cylinder are placed concentrically. The length of the rod is 2320 mm and the diameter of rod is 25mm. The size of the hole in the vacuum rod is 6 mm and total no. of holes are 18, placed at 9 different locations (2 on each location at an angular distance of 180°). Vacuum is created in this rod and goes down the vacuum cylinder. The metering cylinder rotates over rod and pick up the seeds through the seed hopper while passing through it. To evaluate the performance of vacuum cylinder picking % & metering efficiency of metering mechanism were considered under different suction pressure i.e. for groundnut seed 4500 Pa, 5000 Pa and 5500 Pa, for maize seeds 3500 Pa, 4000 Pa and 4500 Pa while for pigeonpea seeds 1500Pa, 2000 Pa and 2500 Pa. On the basis of superior performance the optimum suction pressure inside the vacuum cylinder for groundnut seed was found to be 5000 Pa with a metering efficiency of 106.67 % and maximum picking percentage of 96%. Similarly the optimum suction pressure for maize seed was found to be 4000 Pa with a metering efficiency of 108.88 % and maximum picking percentage of 97% while for pigeonpea seed these values were found to be 2000 Pa, 110 % and 92 %. Hence it was concluded that the designed and developed vacuum cylinder metering mechanism is capable and suitable for planting of bold seeds like groundnut, maize & pigeonpea.

Keywords: Seed, Maize, Groundnut, Pigeonpea, Harvest

REFERENCES

- Barut, Zeliha Bereket. Ozmerzi, Aziz,** (2004). Effect of Different Operating Parameters on Seed Holding in the Single Seed Metering Unit of a Pneumatic Planter. *Turk J Agric For* 28 435-441.
- Bosoi E.S., Vernieav, O.V., Smirnov, I.I and Sultan shakh E.G.,** (1987). Theory, construction and Calculation of Agricultural Machinery. 3rd edition. Oxonian Press Pvt.Ltd. New Delhi, Calcutta. Pp261
- Datta, R. K.,** (1974) Development of some seeders with particulars reference to pneumatic seed drill. *Harvester*. 16(1) : 26-29.
- Davies M. R.,** (2009) Some Physical Properties of Groundnut Grains *Research Journal of Applied Sciences, Engineering and Technology* 1(2): 10-13, 2009 ISSN: 2040-7467
- Karayel, D., and Ozmerzi, A.,** (2002) Effect of tillage methods on sowing uniformity of maize. *Canadian Biosystems Engineering*, 44: 2.23-2.26.
- Kumar Ranjeet, Nandede M. B., Padhee D. and Singh Vardhan Harsh October** (2012) Performance evaluation of pneumatic planter using pigeonpea seeds *Engineering and Technology in India* Volume 3, Issue 2, 120-123
- Li Yang, Bingxin Yan, Tao Cui, Yiming Yu, Xiantao He, Quanwei Liu, Zhijie Liang, Xiaowei Yin, Dongxing Zhang,** (2016) Global overview of research progress and development of precision maize planters *Int J Agric & Biol Eng*, 9(1): 9–26.
- Orozco C. Jonathan** design and development of vacume type multicropo planterwith focus on corn seeding *Philippine agricultural mechanization journal* vol XVIII No. 1
- Wankhade P. Chetan, M. R. Kotwal R. M. A,** (2014) review paper on various seed sowing metering devices *International journal of pure and applied research in engineering and technology*; Volume 2 (9): 429-435
- Yazgi Arzu, Degirmencioglu Adnan, Onal Ismet and Bayram,** (2010) Emine mathematical modeling and optimization of the performance of a metering unit for precision corn seeding *journal of Agricultural Science*, 6(2), 107 – 113
- Yasir Satti Hassan, Liao Qingxi, Yu Jiajia, & He Dali 16 March,** (2012) Design and test of a pneumatic precision metering device for wheat *Agric Eng Int: CIGR Journal* Vol. 14, No.1.

*Corresponding Author