Internat. J. Agric. Sci. Vol.4 No.1 January, 2008 : 215-219

Design, development and evaluation of a power operated maize sheller (Spiked Disk Type)

SACHIN PATHAK
College of Agricultural Engineering and Technology Dr. B.S.K.K.V., Dapoli, RATNAGIRI (M.S.) INDIA

ABSTRACT
The machine mainly consists of shelling unit, reduction unit (worm and worm gear type) and single-phase 1-hp electric motor. The power from electric motor was transmitted to the worm shaft and then from gear shaft to the shelling unit shaft. The developed power operated maize sheller was tested in laboratory as well as operations at load for short durations. The analysis of data collected during the short duration test revealed that the machine is stable and strong and its speed of operation 60 rpm was quite satisfactory. The shelling capacity of the machine was 100.25 kg grains/hr with shelling efficiency of 99.95 % and cleaning efficiency of 99.37%. The breakage percentage was 0.406 which is well within the prescribed limit for such machines. The labour requirement was reduced by 89.60 % using this machine.

Key words : Grains, Maize, Sheller, Shelling unit, Maize sheller.

INTRODUCTION

A large number of cereals viz. rice, wheat, millets, ect. are grown all over the world. Maize ranks first among them with its world average yield of 278 t/ha. In terms of world acerage India ranks fifth after USA, Brazil, China and Mexico where as with regard to production it ranks 11 after the USA, China, Brazil, Argentina, Mexico, France , South Africa, Russia, Romania And Yugoslavia. In India maize is mostly grown in Rajasthan, Maharashtra, Madhya Pradesh, Uttar Pradesh and Haryana and on, a gross total area of 5.98 million hectors to produce 7.26 million tons. If the area under maize in India alone is considered, it ranks fourth among the cereals, while its average yield is 1.2 t/ha. Maize is one of the intensively cultivated crops in developing country the indigenous method of maize shelling by hand is labour intensive, tedious and time consuming. So there is a pressing need for identification of maize sheller, which is economically and technically feasible to suite farmer's condition. Large maize shellers are not economical for small or marginal farmers due to high price and lack of technical know-how. The manually operated rotary disk type maize shellers were also found laborious as well as drudigeous. Considering this need and the power operated maize sheller spiked disk type were designed and developed. The comparative study of performance designed maize sheller (shown in fig1.) were conducted with other methods of maize shelling such as traditional method, hand held tubular maize sheller, 5 hp power operated maize sheller, rotary disk type maize sheller.

MATERIALS AND METHODS

The earlier research work strain gauge studies of wond straight between grain and corn cob have shown that the force necessary to release the gain from the crop depends upon its maturity the maximum force for disrupting this bond is governed by the bond strength between the grain and the scales and glumes in order to break this bond shelling is accomplished by

A) Impact of fast moving member upon the material
B) Rubbing
C) Squeezing
D) A combination of two or more or these action

Design and Construction of Components of Maize Sheller :

The maize sheller manly consists of

a) Shelling unit
b) Speed reduction unit (worn and worm type)
c) Foundation frame
d) Power unit
e) Grain outlet
f) Empty cob carrier
g) Fly wheel with handle

Design of Different Parameters of Machine :

Following empirical formula was used for the design