



## RANGE DISSEMINATION USING MOTORCYCLE SEEDER

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### ABSTRACT

Overgrazing of the pasture lands by the range livestock has made the range lands bare, which is very dangerous for the ecology and ecosystem balance. On the other hand, keeping a suitable balance between the range cover and the flocks of goats or sheep and herds of cattle is very important in managing the ecology and ecosystem balance which is possible by scattering and disseminating the various grass and range cover plant seeds. The traditional seeders of expensive and heavy machineries such as aeroplanes and tractors can not achieve this important task due to economic and technical reasons. Considering the cost, drift, uniform seed distribution, soil compaction and range land higher slopes, the newly designed and developed idea of motorcycle seeder is superior to the traditional seeders. The speed and accuracy of motorcycle seeder is much higher than the manual scattering of the seeds which is tedious. The motorcycle extra power has been engaged in this seeder which operates a blower. The blower transfers the seeds from hopper metering unit to the distributor hoses installed at motorcycle carrier. The motorcycle seeder is therefore more efficient, cost effective and environmentally friendly for the range dissemination.

**Key words:** Seeder, Motorcycle seeder, Small range seeds, Range dissemination

### INTRODUCTION

Range land is one of the important natural resources and national wealth for every country. Over grazing of the pasture lands by the range livestock has made the range lands bare in Iran. The permanent land cover is essential for soil and water conservation and plant life which results in ecology and ecosystem balance. This means that keeping a suitable balance between the range cover and the flocks of goats or ship, and herds of cattle is very important in managing the ecology and ecosystem balance which is possible by scattering and disseminating the various grass and range cover plant seeds.

The plant seeds can be disseminated with the help of centrifugal seeders, or the seeders having exits at specified interval along the hoper bottom length. These seeds are then distributed with aeroplane or helicopter sprayers[5]. The centrifugal seeders which are known as bottom port seeders have been used for quick and cheap sowing of the seeds of microlithic plants and some of the fodder crops seeds. This implement is especially applicable for the small wet fields which have not regular geometric shape or the fields consisting surface or hidden obstacles and is difficult to bring them in regular shape and adjustment. This is due to the fact that the irregular distribution of seed by centrifugal disc, the uncongenial weight and shape of seeds, wind blow and the land surface irregularities all affect the seeder's performance[2].

Aeroplanes are especially useful for dissemination of the hill type pasture lands or the conflagration area. The rice seed dissemination in the California farms and considerable areas of other states are performed by aeroplane seeders in U.S.A these days. The seeds are disseminated either on dry lands or on the drowned lands. This method is very much limited due to certain problems such as its high application cost, drift, and required expert personnel to guide aeroplane exactly near the land surface for the accurate dissemination[5]. The traditional seeders of expensive and heavy machineries such as aeroplanes and tractors can

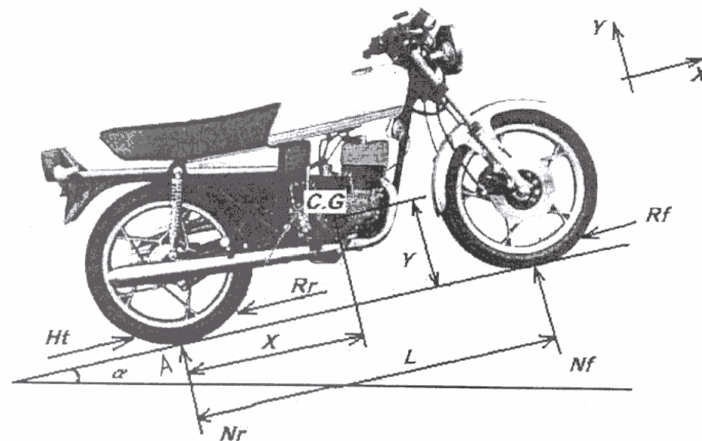
not therefore serve the purpose of range dissemination due to economic and technical reasons in a vast area and also in all of the countries and globally.

To overcome the similar problems in the area of spraying the small land holders farms, the idea of using motorcycle power train for this purpose was proposed for the first time[4]. It was later on realized that this idea can be best utilized for the purpose of cereal crops pest and insect control(8). Finally, the idea of using the motorcycle power train to spray the farm row crops[1] and even the gardens[11] was effectively made practicable. The availability of motorcycle and its degree of manoeuvrability in range land higher slopes forms the principle of using the motorcycle extra power for range dissemination which is the basis of the present paper.

## METHODS AND MATERIALS

The basic principle of the motorcycle seeders rests on the pneumatic operation of a blower, operated directly by the motorcycle engine crankshaft. A designed and developed coupling shaft connects the engine crankshaft to the blower main shaft and therefore the blower becomes active on the power transmission from motorcycle power train[1 and 8]. The motorcycle extra power was initially calculated, a suitable blower was then selected and finally the other required parts were designed, manufactured and fabricated.

To determine the motorcycle extra power, it was considered on an inclined surface as shown in figure(1) to simulate the land slope, and then the rear wheel driven force( $H_t$ ) and the wheels reaction rolling resistance forces ( $R_r$  and  $R_f$ ) due to tire and soil deformations were calculated.



**Fig.1:Motorcycle force analysis on an inclined surface.**

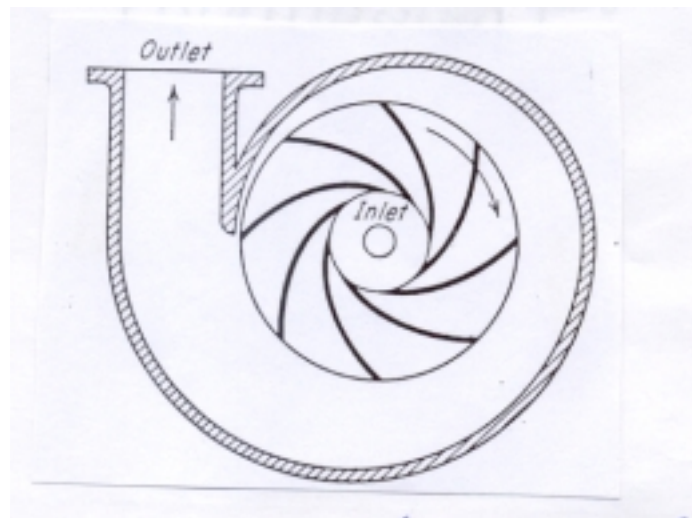
The motorcycle extra power was obtained by the reduction of the power required to overcome the wheels rolling resistance, the power for transportation and slippage from the motorcycle break horse power [3,6 and 9]. The extra power was enough reliable to be used to operate the blower.

The blower is a device for creating current of air which is used to blow the various tiny grass and range cover plant seeds in this case. The blower is of two types, the axial flow type and the centrifugal type. The air is blown in the direction of the axis of the shaft and perpendicular to the revolving blade surface in axial flow type while in the case of centrifugal type, the air enters parallel to the shaft axis, moves axially and exits tangential to the surface of a helix shape shell[7]. The centrifugal blowers are designed for high revolutions and the air pressure created by them is related to the square of revolving speed [10], the motorcycle extra power is also created at high revolving speeds (2000-6000 rpm). This characteristic makes it possible to select the centrifugal blower to be compatible with the motorcycle shaft speed

(Fig.2). A designed and developed transmission. shaft connects the engine crankshaft to the blower shaft using a barbed pin.

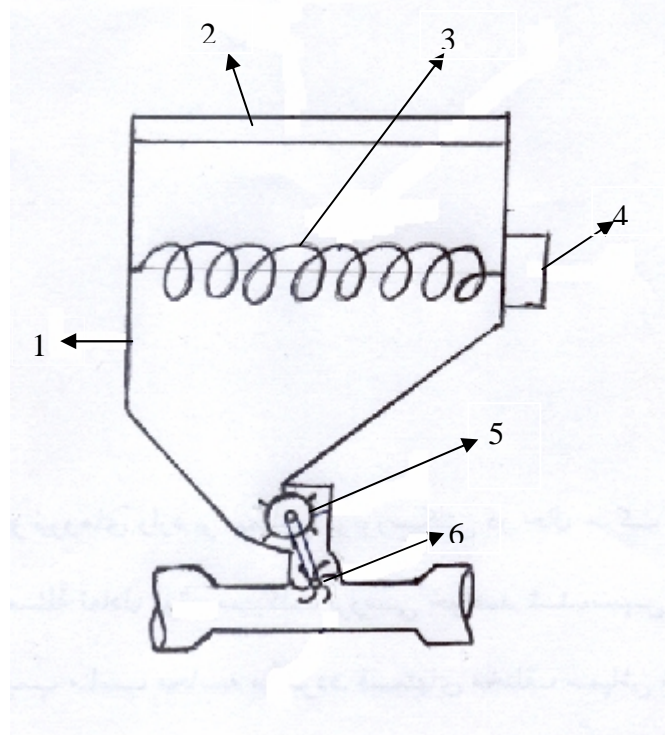
The hopper of the motorcycle seeder is designed to contain the microlithic seeds. The structure of the hope should be such that the seeds com moue easily and in a specified amount in the vicinity of the air flow. To fulfil this purpose, the hopper is made to be funnel shaped while the lower portion is a cone shaped.

A star wheel is fixed in the conical part which is acting as a metering mechanism. It delivers a fixed amount of seeds for a complete rotation. A curved blade wheel is used to deliver moving force to the airflow velocity of the blower via a transmission bell through the metering shaft.

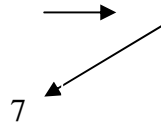


**Fig.2:A schematic representation of a backward inclined centrifugal blower**

A helico-spiral stirrer is used to stir seeds in the hopper and facilitates their flow, though the hopper vibration during the movement of whole assembly prevents the seeds from sticking to hopper wall and also from sticking to eachother. The stirrer gets its moving force from a rechargeable electric motor. The rechargeable electric motor makes the power transmission very simple to the stirrer unit. With minor modification, the power transmission can be obtained from motorcycl

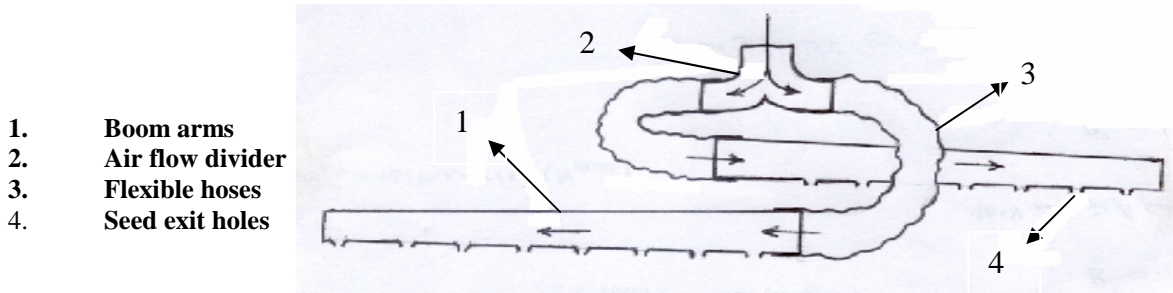


1. Hopper
2. Hopper Cover
3. Stirrer
4. Rechargeable electric motor
5. Metering mechanism
6. Curved blade wheel
7. Venturi



**Fig.3:A schematic representation of the hopper and metering mechanism**

Figure 4 shows a boom, developed and fabricated to distribute the seeds which exit from metering mechanism. The boom has two arms. Each arm diameter is reduced uniformly towards the end. The equally distance holes at the lower part of the arms allow the seeds to exit from boom for distribution over the land surface in a uniform manner.



**Fig.4:The motorcycle seeder boom**

A chassis was fabricated to install the boom and hopper at the rear of the motorcycle. The boom height can be adjusted through chassis whenever necessary. The boom arms can be folded in transportation condition to reduce the width and occupy lesser space on the road. The important characteristics of holes, their diameter and interval were kept in mind when designing the boom. The air flow pressure and the air quantity discharge were also considered.

## RESULTS AND DISCUSSION

The availability of motorcycle in rural area of Iran and the degree of its manoeuvrability in range land higher slopes in comparison with farm lands has made the motorcycle a suitable means to be engaged for range land dissemination. The idea of using motorcycle extra power for range dissemination resulted in the design of a motorcycle seeder. The speed and accuracy of this motorcycle seeder is much higher than the manual scattering of seeds which is tedious. The motorcycle seeder consists of a motorcycle as shown in figure(1), the force analysis of which resulted in the extra power calculation used to operate a, the backwark-inclined centrifugal blower as shown in figure(2), the hopper shown in figure(3) and the boom shown in figure(4). The centrifugal blower was selected to match with the motorcycle engine speed and gives the best result in the speed range of 2000-6000 rpm. The hopper is designed in such a way that it facilitates the Flow of seeds through the metering mechanism to come in contact with the airflow from the blower. The blower rotates the curved blade wheel which rotates the star wheel in turn and hence the seeds are delivered to the seeder boom and are dropped to the land surface trough the holes devised at the bottom of the boom arms. A chassis designed and developed helps in the height adjustment of the folding boom which can be folded during the on-road transportation of the motorcycle seeder.



## CONCLUSION

Considering the cost, drift, uniform seed distribution, soil compaction and the range land higher slopes in comparison with the ordinary farm lands, the newly designed and developed idea of motorcycle seeder is superior to the traditional seeders. The motorcycle seeder is therefore more efficient, cost effective and environmentally friendly for the range land dissemination.

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