"Happy Farm Seeder"

Name: Haris Mahmood **ENROLLMENT:** 03-122182-003

Syed Ali Abbas Mehdi 03-321191-004

SEMESTER: Spring-2020, MBA – IV **PROGRAM:** MBA

DEPARTMENT OF MANAGEMENT SCIENCES

BAHRIA UNIVERSITY LAHORE CAMPUS

RESEARCH PROJECT

Principal Supervisor: Dr. Syed Khurram Jaffery

SUBMISSION FORM of PROJECT

Candidate Name: Haris Mahmood, Syed Ali Abbas Mehdi

I have submitted 4 copies of project report for examination for the degree of MBA.

Project Titled: Happy Farm Seeder

Candidate Signature: _____ **Date:** 03/09/20

Certificate of Principal Supervisor

I, Dr. Syed Khurram Jaffery the Principal Supervisor for the above students, certify that the project is in a form suitable for examination and the candidate has perused his course in accordance with the Rules of the University.

Signature: _____ **Date:** 09/09/20

Recommendation of Examination

I recommend that the project be examined.

Principal Supervisor: _____ **Date:** 09/09/20

Co-Supervisor: _____ **Date:** _____

Not Recommendation of Examination

I recommend that the project may not be examined.

Principal Supervisor: _____ **Date:** _____

Co-Supervisor: _____ **Date:** _____

Statement by the Head Faculty/Department

I support the submission of the project of the above named student for examination under the University Rules for higher degrees.

Signature: _____ **Date:** 9/9/20

BAHRIA UNIVERSITY, LAHORE

Approval Sheet Submission for Higher Research Degree Project

Candidate Name: Haris Mahmood, Syed Ali Abbas Mehdi

Discipline: MBA

Faculty/Department: Department of Management Sciences

I hereby certify that the above candidate's work, including the project has been completed to my satisfaction and that the project is in a format and of an editorial standard recognized by the faculty/department as appropriate for examination.

Signature: _____

Principal Supervisor: **Dr. Syed Khurram Jaffery**

Dated: 09/09/20

The undersigned certify that a pre-completion seminar, and overview and synthesis of major findings of the project, and the research is of a standard and extent appropriate for submission.

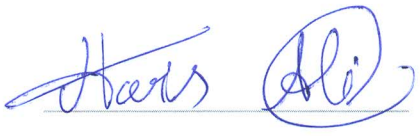
I have checked the candidate's project and its scope, format; editorial standards are recognized by the faculty/ department as appropriate.

Dean/Head of Faculty/Department

Dated: 9/9/20

Declaration of Authentication

I, Haris Mahmood and Syed Ali Abbas Mehdi, Student in the Department of Management Sciences, Bahria University, Lahore Campus, certify that the research work presented in the project is to the best of my knowledge, my own. All resources used and help received in the preparation of this dissertation have been acknowledged. I hereby declare that I have not submitted this material, either in whole or in the part, for any other degree at this or other institution.



Haris Mahmood

Syed Ali Abbas Mehdi

Abstract

This project is all about the characteristics of a Happy farm Seeder. A machine which is capable of enhancing the crop production, particularly rice. With its introduction, it has catalyzed the yield by plowing the land in a minimum time and with greater effectiveness. This report aims to highlight the benefits it provides over the traditional way of preparing the field. Since our country Pakistan has a higher dependency on agricultural production in terms of gross domestic product (GDP). It also possesses the capacity to provide employment and the confidence that is to be built in the minds of the farmer and the manufacturer. The report will also provide the tips for operating the machine along with the deployment measures to be taken for marketing it. The deployment measures include strategies for segmentation, promotion, targeting and positioning. It will also address the problems faced by the farmers in terms of buying power followed by the incentives provided by the government.

The project will also answer the following questions regarding the old practices of farming that comes in the mind of every farmer. For Pakistan and its farmers, there is a daunting question that would they continue practices the way they are continuing? How long would they be able to survive with such practices? Are these practices sustainable, especially because there is a global competition, as well as climate change? How does the agriculture sector plan to continue such practices in the wake of the current global environment? The answers to these questions are very simple. Pakistan cannot continue the malpractices in the agricultural sector for a longer period. the sector has to choose innovative measures over its redundant old-age measures to compete in the international arena. Pakistan is a global player with vast agricultural land. For Pakistan, it is critical to enhancing its agricultural exports to reduce its current account deficit. More than 100 million of its population is associated with agriculture, and rice is one of

its biggest export in the international market. Using old measures in a rice crop production will have a drastic long-term impact on the sector. Rice is considered to be the backbone of the agricultural sector. Advanced technology must be used to increase the productivity of the crop.

Table ofContents

Table of Figures& Tables

Chapter 1: Introduction

Our planet is facing lots of challenges. Some of them are natural, but many of them are self-inflicted and are being caused due to human activity. Pollution, being one of the biggest problems our planet is facing, is also the biggest killer. Although more attention is given to other social problems, such as terrorism and poverty, pollution is also a major, and the biggest contributor to current problems. World Health Organization has estimated that more than 7 million people die prematurely due to air pollution every year(Cohen, et al., 2017). 2/3 (two-third) of these people belong to the South East Asian Region, which comprises important countries such as China, India, Pakistan, and Bangladesh. No other problem has killed this much of people than Air pollution.Happy Farm Seeder is a product that helps deal with the straw and stubble (residues of Rice crop). The product has state of the art features and is designed in such a way that the stubble of the crop can be fixed properly, without burning it. It has been used in many countries around the globe and benefits it has provided the way to reduce pollution level from agricultural waste.

Pakistan is home to more than 200 million people. It has been placed as the third-worst country in terms of Air Pollution. Lahore, being the second-largest city in the world with about 10 million citizens. Every winter, there is an air emergency placed in the city by the administration, where schools are shut down, office hours are limited and advisory is issued which advises people to limit their outdoor activity(Rehman, 2019). This issue is prevailing for a long time, and every year, the intensity is monitored. In 2019, Lahore was the second polluted city in terms of air pollution, just after New Delhi, the capital city of neighboring India.

It is very important to understand what happens in winter which makes Lahore so polluted. Undoubtedly, the industrial waste is one of the biggest contributors in the worsening the air of Lahore. The smoke from the chimneys of industries pollutes the surrounding air, causing people severe health problems. It is also paramount to mention that the weather itself plays a vital role. In winters, due to cold weather, the polluted air is unable to go up the layers of the atmosphere and is stuck to ground levels. In summer conditions, the polluted air can escape easily, leaving the ground levels of air breathable and healthy. Apart from the weather and industrial polluted air, another factor plays a vital role and adds up to air pollution. That factor is the burning of crops. Winter is the harvesting season of Rice, one of the biggest and widely grown crop in Pakistan. Central Punjab is the area where rice is grown on massive levels.

There is a dire need to control the pollution, especially in days where crops such as rice are harvested. Farmers have been adopting traditional ways in Pakistan to treat the residue of crops. Predominately, they use fire to treat the residue, which not only results in polluting the environment, it also damages the soil. Pakistan's economy is heavily reliant on agriculture, and almost 65 % of its population lives in rural areas. 65% of more than 200 million population is associated directly or indirectly with agriculture. Their agricultural practices impact the overall economy massively. Therefore, introducing modern practices in agriculture is the need of the hour. Modern practices will not only reduce agricultural waste but will also enhance the productivity of the sector, which is vital for its growth. Currently, Pakistan is facing economic turmoil. The agriculture sector is the one that can indeed help the economy to stand on its feet. Agricultural developments create a positive impact on the economy, as well as on the lives of those who are associated with it. With the use of better technology, the productivity of the sector can be enhanced. When the productivity of this sector will enhance, it will create an overall

economic activity and will help in the generation of money. Unfortunately, the agricultural sector is yet unable to generate cash inflows on a massive level. There are lots of people associated with the sector, yet poverty is still prevailing(Hafiz Mujeeb ur Rehman, 2011). If one compares the agricultural sector of Pakistan with sectors of the developed world such as the US or China, there is a wide advancement in the developed world. It is due to the use of modern technology and modern equipment, which has not only helped the sector in a massive increase in production but also has helped improve the lives the millions of people associated with it. Therefore, in light of current circumstances prevailing in Pakistan, there is a dire need for technological advancements and innovative equipment that can help the sector to flourish and increase the productivity of the land.

Chapter 2: Problem Definition

There is a wide trend of burning the stubble across Pakistan, especially in central Punjab, where rice is grown on massive levels. Once the rice is harvested, the grains are separated from the straw. Grains are the most important component of the whole straw, so once it is separated, the straw becomes useless for farmers. The easier way to get rid of the straw, which is 90% of the whole crop, is to burn it down. Every year, more than 40 million tons of rice residue is burnt in Pakistan. One ton of rice residue contains 4-6 kilograms of Nitrogen, 15-20 kgs of potassium and 1-2 kgs of phosphorus(Irfan et al., 2014). These are deadly gases, and once released in the atmosphere, cause lots of breathing problems to people.

Not only does it lead to breathing problems, but it also causes severe diseases, such as lung cancer, esophageal cancer, and mouth cancer. Apart from these diseases, eye irritation, skin problems, and hearing issues are also related to this. Pollution in Pakistan has become a chronic factor. Every year, hundreds and thousands of acres are burnt and their smoke is released into the atmosphere. Not only is it dangerous for humans, but the whole ecosystem of the country is under severe threat. It is been noted by scientists that the whole ecosystem of the area where crop residue is burnt gets affected severely (Shyamsundar, et al., 2019). The birds and animals who live in nearby areas are also affected. The nests of birds are damaged and they have to relocate due to high pollution and heat caused by the fire. Many animals die in this process as well. So, in order to understand the problem being faced by millions of people in Pakistan, it is not necessary to look through the spectrum of humans. Human activity is also damaging the entire ecosystem of the country, resulting in damage to animals and other species.

Another problem that is associated with crop burning apart from the pollution it creates is the reduction of the usefulness of the land. When the upper layer of the soil is burnt after harvesting, important and useful nutrients are lost (Rao&Siddaramappa, 2008). The fire results in burning the nutrients which are extremely helpful for the betterment of the soil and the next crop. Once the old crop is harvested and burnt, the soil has to be prepared for the next crop. However, farmers are unable to understand that the hassle they avoid by burning the crop impacts the soil negatively. They have to spend large sums in the shape of fertilizers to add important nutrients back into the soil. They are unable to realize that the straw and stubble carry important nutrients, which can be beneficial for the soil (Rao&Siddaramappa, 2008). Burning not only wastes those important and critical nutrients, but it also burns the upper layer of the soil, resulting in less output for the next crop.

Agriculture is the backbone of Pakistan. Nearly half the population is associated with this sector and millions of families across the country rely on this sector. The malpractices and lack of awareness have struck this sector hard. The agricultural practices around the world have improvised, and are using innovative technologies to increase their output. However, by relying on old and redundant methods, Pakistan is not only reducing its output per acre, but it is also adding to its costs. This is such a massive problem that an increase in cost is resulting in pressure on exports, and Pakistan is finding a hard time competing in the international market.

Moreover, the neighboring countries like India and China are improvising their agricultural sector, however, Pakistan on the other hand is still relying on the old and redundant practices. Not only is Pakistan losing in the international market, but it is also damaging its air quality, resulting in extra and additional damage, which can easily be managed through improvised and innovative technology.

By far, Pakistan's economy has been import-oriented. Pakistan has been suffering from a balance of payments and current account deficits for a long time. The import of fertilizers add to the current account deficit and has a major share in imports. The problem which our country is facing is how to reduce reliance on imports. Import substitution is the key to a sustainable future. It is paramount for Pakistan to reduce its imports, and take measures that can not only increase domestic production but also reduce reliance on imported material. Fertilizers are key to the agricultural sector. They are necessary to increase the yield of crops and enhance the soil. However, over-reliance on fertilizers not only increase the import bill but also increases the costs of farming, which results in increased prices of food.

This ultimately leads to inflation in the country. If one practice is corrected, it can have a massive impact on the overall agricultural sector. If the consumption of fertilizers is reduced, not only will it result in a reduction of import bill and balancing of current account deficit, it can save a sizeable amount of money spent by farmers. The problem is that farmers are neither educated enough nor is ample awareness to make them realize that the residual of crops they burn is sufficient for the land to increase their nutritional capacity(Ahmed, 2019). Farmers are to be educated and informed that what they are doing is neither in their interest nor in the interest of the country. What they need to do is, they need to purchase Happy Farm Seeder, a product that can revolutionize the agricultural sector. It can add important nutrients back into the soil. This can not only increase the productivity of the soil but can reduce the costs of fertilizers drastically.

Pakistan has a large agricultural land. However, it is being operated by small farmers mostly. The average size of a farm in Pakistan is approximately 5 acres. According to research conducted by All Pakistan Farmers' Association, farmers lose nearly PKR 40,000 every crop due

to wastage of important residuals. These residuals are wasted by burning them, and then fertilizers are purchased to compensate for the lost nutrients. So not only are the farmers increasing their costs by malpractices, but they are also increasing the import bill, which has drastic results for the economy. it is paramount to highlight this problem and recognize it as a problem plaguing the agricultural sector. The cost of agriculture is increasing in Pakistan due to such malpractices and sooner than later the country will be unable to compete in the international market. In the international market, big agricultural players such as India, China, the EU, South American countries, and the US are already competing. They have transformed their agricultural sector in such a way that the yield and output have increased, so has the costs decreased. If Pakistan has to compete with these international players in the international arena, it is paramount to increase the yield by lowering costs.

PKR 40,000 is being wasted every crop by the Pakistani farmers due to their redundant practices. If on average farmers waste PKR 40,000 on every crop of a 5-acre farm at least twice a year, they are wasting billions of rupees every year. These billions of rupees can be utilized elsewhere like educating the farmers and introduced innovative machinery (Bhattacharyya, et al., 2018). If the farmers start using Happy Farm Seeder, not only can they earn PKR 40,000 every crop by reducing reliance on fertilizer and increasing yield, they also can contribute massively towards the grave environmental problem our country is facing. This machine not only gives an incentive to farmers by increasing their threshold income, but it also gives them a motivation to play their part in the reduction of air pollution (Sidhu, et al., 2015). They are equal citizens of this country and have the same duty as other citizens. They have a role to play in the future of Pakistan.

The future of Pakistan should be pollution-free, and the agricultural sector has to rise to these expectations. Using Happy Farm Seeder and mixing importing nutrients back into the soil is necessary. All over the world, the same practices are being carried out. The advanced economies who know the importance of agriculture have found ways to increase the yield (Bhattacharyya, et al., 2018). Pakistan is still far behind the other world. it is high time that the people start realizing the practices they used to do are redundant, are old, and are costing not only them but the entire country. These practices are costing in terms of monetary loss, such as increased current account deficit and increased per acre cost, also on the pollution, it spreads. Hundreds and thousands of people are falling victim to horrific diseases because of the pollution spread by farming practices (Bhattacharyya, et al., 2018). It is high time farmers and the entire agricultural sector realize that these practices they have adopted are neither sustainable nor healthy. They should realize that if they have to adopt sustainable agriculture, modern and innovative practices are to be adopted.

Stubble burning is not only hazardous to nature but also reduced the output of soil. Can Pakistan's farmers bear the losses they make every year to the soil? Investing a little amount of money and saving important nutrients of soil is advisable. Modern technology doesn't cost much, all it is required that there should be awareness amongst the farmers. Unfortunately, Pakistan's farmers are less educated and are not aware of modern practices. It is high time that they should realize that such redundant trends cannot continue, and sooner than later, they have to adopt better ways, otherwise, competition in the international arena will eliminate Pakistan from the agricultural market. Moreover, Pakistan is compliant with global climate change policies. Paris Climate agreement is such pact on which Pakistan is a signatory. Burning stubble is hazardous to the environment, and release harmful gases to the air. The adoption of such

practices can create a negative impact on Pakistan's international image. Compliance with climate agreements is the need of the hour for Pakistan. Therefore, it is critical that Pakistan understands the problem of malpractices in the Agricultural sector and save the environment from harmful practices.

Requirement Analysis

Many farmers across the region think that there is no viable option other than burning the stubble. It is paramount to make them understand the damages stubble burning causes. Moreover, it is also important to give them solutions, which can reduce pollution, as well as, can increase the income of the farmers. In Pakistan, there is a majority of those farmers who hold smallholding, such as 2-5 acres of land. Such holding barely meets their expenses, so giving expensive options to small farmers would not be productive.

There is a need to come up with solutions that can help curtail the problems caused by stubble burning. Many farmers across the region think that there is no viable option other than burning the stubble. It is paramount to make them understand the damages stubble burning causes. Moreover, it is also important to give them solutions, which can reduce pollution, as well as, can increase the income of the farmers. In Pakistan, there is a majority of those farmers who hold smallholding, such as 2-5 acres of land. Such holding barely meets their expenses, so giving expensive options to small farmers would not be productive. Therefore, understanding the current economic and environmental conditions in Pakistan, a new product named "Happy Farm Seeder" will be introduced in the market. It is paramount to understand that Happy Farm Seeders is the need of the hour.

This project is not only related to agricultural activity but also to combat pollution in Pakistan. Happy Farm Seeder combats both, the additional costs farmers have to bear every year in terms of fertilizers, and pollution they create once the crop is harvested. This product is the most suitable product when it comes to farming practices. What Pakistan has been facing is catastrophic, and it is high time people should stand up and follow such practices which are not only beneficial for them, but also for the good of the masses. Pakistan has a high deforestation rate and the lowest percentage of forest cover. That means that the natural cleansing of air is on its minimum. There are fewer trees that can clean the environment, and with an increase in industrial setups and a massive increase in farming, air pollution is on the rise. Round the year, megacities of Pakistan, especially those which are surrounded by farmlands such as Lahore, Faisalabad, and Rawalpindi are at high intensity for air pollution(Qaisrani, 2014). It is debatable whether this air pollution is caused entirely by farming malpractices, yet these practices contribute massively towards the deterioration of air in these cities. People are suffering from health hazards such as respiratory problems, lungs, and esophageal diseases, etc. Although the government is playing its role in planting more trees and introducing ideas such as plans for urban foresting, it is critical that the agriculture sector comes up and takes the lead in making the lives of millions of people easy. Their practices are causing lots of damage, maybe more damage than good.

It is important to understand the objectives and goals of this project. Although the project has multiple commercial benefits, some of its objectives are way more forward-looking than the commercial objectives of it. The project aims to revolutionize the agricultural sector. The primary aim of this project is to increase awareness of the farmers that they can do much better than they are doing currently. This product is not only to combat pollution but also will decrease

reliance on fertilizers. Farmers need to understand that this product can do lots of good to them. The agricultural sector of Pakistan is the biggest sector, and the majority of the country's population is associated with this sector, directly or indirectly. If farmers are saving money by using this product, it will have a beneficial impact all across the sector(Qaisrani, 2014). This project aims to increase awareness of what exactly can be done to increase sustainable practices in the agricultural sector. Currently, the practices related to post-harvesting are not sustainable, and the pollution they are causing is yielding catastrophic results for this country. The focus here is to make the farmers aware of what they can do. The project aims to empower them and bring them to the national system. This can only be done when they realize how necessary it is to use Happy Farm Seeder.

Another major objective of this project is to decrease chronic pollution in Pakistan. Although this product is not for industrial pollution, it combats another massive source of pollution, the agricultural source. Stubble and straw burning can be reduced extensively if Happy Farm Seeder is used. Burning the residuals after harvesting crops release lots of harmful gases in the air. This is a major cause of smog and pollution, which may not be visible in other times of the year, but in winters, it traps in the lower atmosphere and reduces visibility. This is a major cause of concern for the entire population of megacities and suburban units. This project aims to increase sales and reduce crop burning significantly.

Chapter 3: Design and Implementation

Happy Farm Seeder makes use of a rotator which will pick the grains from the straw, and will chop the rest of the straw and mix it back in the soil. Not burning the residue of the crop will have dual impacts on the farmers, as well as on the environment. Firstly, when the residue will not be burnt, the environment will not be polluted, saving the air from lots of harmful gases. Secondly, the use of Happy Farm Seeder will positively impact the financial situation of the farmers. World's leading science journal, Science Magazine says that using a technology that mixes the straw with the soil can increase the output by $80-$160 per hectare. This means, by using Happy Farm Seeder, an average farmer who has a holding of roughly 5 acres of land, can make an extra PKR 30,000 to PKR 40,000 from the crop.

The journal further states that there is an increase of 10% - 20% in output next year, as the straw contains rich nutrients. Burning these nutrients not only waste them but also damages the upper layer of soil, which has the most nutrients(Pathak, et al., 2006). Happy Farm Seeder has another option which can be beneficial for farmers. It can save the straw and mix the residue in the soil. The straw can be used as fodder for livestock. Those farmers who have to purchase fodder for their livestock, can use this feature of Happy Farm Seeder and save the straw for their animals.

Figure 1 shows the operation of Happy Seeder

Components of Happy Seeder

A happy seeder consists of 11 major components which plays a vital role in operating the seeder in an efficient way. The first major component is the frame of the happy seeder. The frame is made of mild steel which is welded with two mild steel angle irons that are responsible for strength and robustness. The second component is the slit and furrow openers. Its role is to drill the soil in order to place the seed along with fertilizer at that particular place. The delivery of the fertilizer and seeds are ensured through pipes and action of the drive wheel to direct them to the opener. The slit opener comes in various types. Normally the inverted T-type openers are used and the spacing between the two openers varies from 20 to 22 cm.

Moreover, the cutting of the furrow openers is done by the mild steel plate which is 8mm in thickness. The third component is the flails. Flails are basically wings that are slo made of mild steel attached to the shaft. They are located on the rotors in a way that they are placed exactly ahead of the furrow openers. As the shaft rotates, the flails rotate too as they aid in cleaning the residue left in order to compensate for the drilling of fertilizers and seeds at the seed rows. The fourth component is the fertilizer and seed box. The shape of the box is a trapezoidal one and made of 2mm mild steel sheet. Its purpose is to aid in planting the seeds along with the fertilizer in a very precise way. They are placed on the side of the frame. The box for feeding fertilizer is located in the front and for the seed at the rear(B. R. Kamboj, 2013).

The fifth component is the seed metering mechanism. This mechanism is responsible for monitoring the seeds sown with respect to the seeds in the seed box followed by the delivery through fluted rollers. The seed rate adjusting lever consists of a scale measuring the rate of the seed delivery. The flow of the seeds to the deliverypipes is controlled by the flow tongue adjustment lever. Inside the mechanism is the seed boot which is responsible for dropping the

seed into the slit through the furrow opener. Inclined rotary plates are the one that direct the seeds to the cups. The seed metering strip is located above the seed box. It is basically the strip of iron with the holes equally distributed across the strip. The rate of seed flow is adjusted by changing the holes. The rate can also be adjusted by changing the gears with higher teeth which slows down the seed rate and vice versa. The last part of the seed metering mechanism is the seed cups. The role of these cups is to take the seeds which are delivered by the inclined rotary plates followed by the dispensing of the seeds to the delivery pipe.

The sixth importantcomponent is the fertilizermetering system which works in a same fashion as of the seed metering system. For enhancing the delivery of the fertilizer, an additional fertilizer box is placed and so adouble row happy seeder is used for this purpose. Here the urea is mixed with the soil between the two seed rows which serve as the seventh component. The slits are opened with the aid of double discs coulters. The eighth component is the drive wheel that is mounted of the frame side. The function of the drive wheel is to drive the fertilizer and seed metering mechanisms(B. R. Kamboj, 2013). The diameter of thewheel is between 70 to 75 cm. The drive wheel consists of the chains that are connected to the shaft and wheel itself. The designing of the wheel is such that the circumference of the wheel contains lugs that help in avoiding slippage. The lugs are of 6 cm in height.

The ninth is the depth control wheel. They are located at the side of the frame and its function is to monitor the insertion of the furrow openers that is directed into the soil at a particular depth across the field for seed placement. The depth can be varied through the adjusting screw. Considering the power transmission unit which serves as the tenth component of the happy seeder. There are two power transmissions unit in which one is the PTO shaft and the second is the drive wheel. The PTO shaft is responsible for driving the flails and is attached to

the gearbox through PTO attachment shaft. Whereas the drive wheel accounts for the power generation to the seed monitoring mechanism along with fertilizer delivery that is directed towards the soil.

The drive wells rates the chain which in rotates the seed and fertilizer sprockets gear. With the drive wheel there is a flip gate that aids in applying the oil/grease to the chain for lubrication when necessary. The last component is the seed and fertilizer delivery pipes. These pipes are attached to the respective boxes and their purpose is to collect the seed and fertilizer through cups(B. R. Kamboj, 2013). The pipes are properly connected to the flow control tongue and fertilizer boot. So these are the components that play a crucial role together to make the happy seeder an effective machine for crop production.

Operationof Happy Seeder

The happy farm seeder consists of three hitch points in which one is on the upper and the other two is in the lower position. The seeder is connected to the tractor through the link pins. The top link pin aids in leveling the machine and such arrangement helps in proper alignment of the machine at set angles when in contact with the soil. The entire operation of the seeder depends upon the optimal capacity o the tractor and size of plantation. After the attachment with the tractor, the seeder is calibrated in terms of fertilizer and seed flow rate, sowing depth and spacing between plants. When the tractor moves, the drive wheels rotates too which causes the fertilizer and seed shaft to rotate as well.

The rotating shaft enables the metering mechanism (fluted rollers and plates) to move and so the fertilizer & seeds are passed to the delivery pipes to the respective boots. Both the fertilizer and seeds are placed in the soil through the furrow openers. Such action is only possible

through fertilizer and seed boots. The seeder gets the power from the PTO shaft and alongside the shaft, the flails starts rotating in order to clean the residue at the front side of the openers just to avoid accumulation of seed rows as they get dragged with the machine.

Figure 2 shows the uprooting of rice residues (higher soil moisture)

The requirements of using the happy seeder enable the use double clutch tractor bearing the capacity of 45 to 55 hp for 9-12 tyne happy seeder. The double clutch mechanism in the tractor helps in reducing the speed for clearing residues that occasionally build up while in operation. The tractor engine is set between 1800 to 2000 RPM with the help of PTO engagement. The gear is set in 1st or 2nd position which is dependent upon the residual load. It is recommended to set the fertilizer and seed rate before operating. It is essential to note that the oil level plus gear box must be inspected as per the guidelines issued by the manufacturer.

The calibration procedure in the field considers the following measures. The first measure is to fill the fertilizer and seed boxes followed by the 50m mark in the field. The second measure is to use the delivery outlets of the pipes through polythene bags. Start the machine and

observe the collection of fertilizer and seeds after covering 50 meters(Singh, 2013). So these are the measures which are taken before initiating the sowing operation so that the desired results could be achieved. The important part in the calibration process is the determination of fertilizer and seed rate.

The tips for operating the happy seeder are many and they are in the following. At the first phase, the soil moisture have to be kept at optimum level for the entire operation. In orderto ensure best performance of the seeder, it is wise to ensure level of soil moisture must be slightly lower than in the field. Another importantaspect of delivering best performance is to distribute the residue in a uniform manner all over the field. The point to be noted is that the moisture level have to be monitored as they reside on the straw along with the dew which acts as a hindrance to the rotary movement of the machine. The best option is to use the happy seeder after the drying of the dew. The second phase is to make adjustments in the control wheels for sowing operation instead of hydraulic lift. The use of hydraulic lift can cause extensive damage to the flails which then results in uprooting of the anchored residue. The ground clearance between the field and flails must be 2 to 3cm.In case the flail gets broken, the replacement must be ensured otherwise the vibrations coming from the machine will result in further deterioration of the machine(Singh, 2013).

On the other hand, the maintenance of the happy seeder holds an important role in defining the life expectancy. All the bolts and nuts must be checked before operating it. Secondly the replacing part must be looked upon and changed immediately. An example can be illustrated which accounts for furrow openers and flails. If both are worn out, the replacement must be ensured for effective working. Similarly the seed and fertilizer must be inspected along with the delivery pipes so that a proper flow will not be disturbed at any costs. The drive chains has to be

checked for lubrication and adjustments. So these are some of the maintenance procedures that must be taken care of.

Moreover, it is preferable to level the field for proper drilling of crops that will help in achieving the uniformity in soil moisture over the field. The leveling f the field can be achieved using laser technique. An accurate leveling is ensured, thus contributing to the enhanced crop production. The next step is to distribute the loose residues over the field for uniformity. In the case of humid climates especially in the months of July and August, the moist residue tends to clog the planter and so it is wise to use the happy seeder at optimal moisture level. Depending upon the land conditions, the machine has the capability to plant 7 to 8 acres of land for rice crop having residue on it. The effect of temperature and type of land with respect to moisture level can increase or reduce its efficiency. Likewise in summers, in the wheat crop plantation, the happy seeder can plant more than 10 acres in a day.

The downside of the soil moisture could results in choking of the machine and plus it also has an adverse effect on wheat germination. It is very essential to ensure the proper row spacing, depth of the drilling and seed quantity. A small trial can be taken which can help in determining the seed and fertilizer needed for that particular area. Another important measure to be kept in mind is that the seeds to be planted must be clean and free from all sorts of pebbles and soil layer. Mixing the fertilizer and seed can further damage the metering mechanism(Singh, 2013). The seed box to be filled should not more than three quarters which could further result in buckling of the seed box. For fertilizer, the measure to be taken is that it should be clod free for effective operation. The last is the calibration of the machine which is done both in the laboratory and in field.

The things to be considered after the operation is the proper cleaning of the happy seeder which includes parts like fertilizer & seeder boxes, metering system, delivery tubes, flails, furrow openers, ground wheels and window drum. These parts haveto be cleaned at the end of every season after finishing the operations. Then comesthe stage of drying process, lubricating the bearings and drive chains along with sprockets. It is necessary to keep the machine at a dry and cool place.

Crop Residue Management

The happy seeder works in a way that it first cuts, lifts the residue and disperse the standing stubble alongwith the sowing of seeds in a single operation while managing the rice residue. In order to reduce the straw load, the seeder contains a straw managing motor that is specifically designed to cut the standing stubbles in a precise way which is upto 7.5 cm in width. The motors issituated a little ahead of the furrow openers. A recent research shows that such technique has resulted in 30% reduction in overall straw load. So considering the benefits it gives is the planation of seeds in timely manner without much effort in preparing the land.

Secondly, it helps in saving a lot of water for irrigation purposes plus it also contributes in keeping the temperature and moisture level at optimum. With the use of happy seeder, there is less probability of weed infestation and with catalyzed microbial activity. Lastly, it aids in making the land a fertile one with concentration of nitrogen oxide upto 46%.

Methods of Plantation

There are two main methods of plantation which are laser land leveling and zero tillage. The first is the land leveling through laser. It is the process of smoothing the land surface up to 2cm. The measurement is taken from the average elevation with the help of laser-

equippedbuckets. It is highly precise method with greater accuracy in leveling the soil(Ahmed, 2019). The advantage it offers is the uniform moisture environment which is essential for crop production, germination in a uniform way along with the reduction in water and time required by the land. The second is the zero tillage technology(B. R. Kamboj, 2013). This method is very useful for wheat production and in Pakistan almost 70% of the land fulfills the food needs of the population.

For zero tillage process, the seeder is modified to perform seed drill upto 11 inverted T times that injects the seed wheat into the prepared field in a single operation. With such method, the amount of water and essential nutrients increases and reduces erosion. So overall it is evident that the use of happy seeder can bring excellent results and can significantly enhance the production of wheat crop with minimum effort. There are other methods as well for enhancing wheat production which is bed planting of wheat and wheat straw chopper that uses combine harvester with minimum amount of fuel (diesel).

Financial Projections

The financial projections of the Happy Seeder hold a significant aspect with respect to the conditions in Pakistan. The countries especially India suggest that the net present value or NPV is PKR 21,546 per hectare in constraints with the stubble burning. For the 20 year period, it was found that the NPV of the happy Seeder was more sensitive in correspondence to yield. The following table shows the financial benefits the Happy Seeder offers over conventional farming(R.P. Singh, 2008). From these figures, it can be seen that this product is viable for the farmers in Pakistan. It can be used in any field with different ranging of soils.

Additional it can also be seen that there can be a lot of savings on fertilizer and seeds that can reduced the operational costs and an ease for the government in providing incentives. As the product is new to the Pakistani market, it will take a considerable time to get the accurate picture of the cost benefit analysis against the usage.

Financial benefits of HS	**NPV of benefits (Rs/ha) over**	
	Conventional	**Zero tillage**
1. Wheat yield increase		
- *No increase*	31,910	6,150
- *5% increase*	59,500	33,945
- *10% increase*	87,250	61,524
2. Herbicide use		
- *50% reduction*	31,910	6,150
- *No reduction*	21,415	-5,097
3. N fertiliser use		
- *With reduction*	31,910	6,150
- *No reduction*	30,325	4,576
4. Irrigation **water saving**		
- *With 30% reduction*	31,910	6,150
- *With no reduction*	28,640	6,150
5. Discount rate		
- 7% discount rate	31,910	6,150
- 10% discount rate	24,190	4,783
- 4% discount rate	44,785	9,267
-		
6. **Machinery operations**		
- 1 discing	31,910	6,150
- 2 discings	38,115	6,150

Table 1 shows the NPV of the Happy Seeder in comparison with conventional /zero tillage farming

Chapter 4: Testing and Deployment

Rice is cultivated all across Pakistan. However, the regions where it is widely cultivated in Central Punjab. Central Punjab consists of cities such as Lahore, Sheikhupura, Gujranwala, Faisalabad, etc. The soil and atmosphere of the central Punjab region support the cultivation of rice, and this area is considered the best for rice around the globe. Therefore, the place where this product will be launched will be Lahore and Faisalabad in the initial stages. Lahore and Faisalabad are hubs, and many smaller towns and cities are connected to these megacities. Famers of Sheikhupura and Gujranwala can easily access and purchase Happy Farm Seeder from Lahore, and Cities such as Sargodha, Hafizabad, Jhang, and others can access Faisalabad and purchase the product from there.

Testing

The testing is done in the laboratory, staring from visual inspection of the seeder till final evaluation. The visual inspection is done against the desired proposed plan for developing the happy seeder. The visual analysis includes the correct alignment of delivery tubes, drive mechanism followed by the complete assembly of the machine. Next is the calibration of the happy seeder which is ensured to determine right amount of fertilizer and seeds are added. The seeder is jacked up for testing the rotation of driving chain and wheel shaft(B. R. Kamboj, 2013). The circumference of the driving wheel is analyzed followed by the working of the furrow openers. It is to be noted that the distance set for the seeder is 50 meters.

The testing also includes the compatibility of happy seeder with different type of fields with respect to soil water content and temperature. There are different types of soil depending upon the land/field where the operation is to be ensured. Considering the loamy sand, where the

interaction between the depth of the soil and mulching exists regarding the water content. Similarly the temperature of soil holds an important significant factor. The testing includes the depth of the soil which is to be 7cm and the temperature to be maintained is around 23 degrees Celsius. The happy seeder has the ability to sown different crops with significant reduction in tillage that results in enhancing the yieldproduction upto 9 t/ha. It helps in suppressing the soil and weeds evaporation along with the retention of organic matter.

Figure 3 shows the field being cultivated for sowing operation

Taking the production of wheat into account, the yield increases after the preparation of the land which normally takes 2 to 3 years due to the stubble that enhances the organic activity in the soil. So these are the main measures of testing the seeder in order to ensure desired results for what it was developed. The happy seeder comes with super straw management system or (Super SMS for short). Its main function is to ensure evenly spread of residue as mulch. The benefits it provides are countless(Qaisrani, 2014). It aids the farmers in investing time for plowing the field that an edge in planting followed by the harvesting two weeks before and so pre-monsoon heat can be prevented. In addition to this, the most important factor is the conservation of natural

vegetation without any side effects that could negatively hamper the ecological system and ensures food security.

Pricing factor

Considering the most important requirement is the price which is the most important factor considered in the Pakistani market. The Pakistani market consists of people with middle to low-income groups, therefore it is important to come up with a price which can attract these income groups. This product is not available in Pakistan, and in the international market, it costs around $2,000, which roughly makes PKR 350,000. PKR 350,000 seems a lot for the average farmers, but it is important to note that the Government of Pakistan has ordered subsidies in those products which can be used in solution to environmental problems.

Therefore, it is expected that the product can receive subsidies from the government. Cost-plus pricing strategy will be adopted for Happy Farm Seeder, where a 10% profit margin will be kept. This pricing strategy will be extremely helpful in attracting farmers from all across the country, as they will be looking for such a product which is reasonable in price, as well as, economically beneficial in the longer run. Moreover, the advantages of having a cost-plus pricing strategy would be that it will make the product financially accessible to the target audience, considering the prevalent economic situation in the country.

This product can increase the output of the crops, boost the monetary status of a poor farmer, and most importantly, decrease pollution levels in the country. Happy Farm Seeder will not just give profits to its users, it will deliver them a value, which will be far long-lasting. The company wants the value of this product should reach the masses, and farmers should especially use this machine during the harvesting of rice(Iqbal, 2015). To facilitate customers, the company

has placed the machine in regional hubs like Lahore and Faisalabad, from where it can easily be transported to local and rural areas. Price has been kept normal, with a cost-plus pricing strategy of a 10% profit margin, so that it should be in the financial reach of target customers. Happy Farm Seeder will be placed in main tractor outlets of Lahore and Faisalabad, where the customers can get guidance from local sales staff regarding the benefits of the machine.

Promotion Strategy

The success of Happy Farm Seeder is highly dependent on how it is promoted. Various advertising tools will be used to reach the target audience. Promotion of Happy Farm Seeder will be done through Electronic and Local Print Media, as well as direct selling and word of mouth using the Agriculture Department.Television commercials are most important in reaching the audience. It is important to understand that the target audience of Happy Farm Seeder is in rural areas of Pakistan, and the literacy level of the audience is not very impressive. Therefore, well-explained television advertisements will be adopted. The main channel on which TVCs will be aired will be Pakistan Television (PTV). PTV has a massive reach and impressively targets rural customers, as only PTV is available to rural areas and remote villages (Gallup Pakistan). PTV has a special program for farmers, in which they guide them about the latest innovations in agriculture.

Moreover, pamphlets will be distributed in seeds and fertilizer shops and the owners of these shops will be given information about Happy Farm Seeder.These shop owners have regular interaction with farmers, and once these shop owners know the benefit of the product, they will communicate it with other farmers.Agriculture helpline is a tool that is widely used in Punjab to

educate farmers. A liaison can be created with the Ministry of Agriculture than they should further educate farmers about the features of Happy Farm Seeder.

Word of Mouth technique can be used, where Agricultural helpline can convey benefits of using the machine in their fields. Moreover, tractor display center owners would also be contacted and features of Happy Farm Seeder will be discussed. Direct selling technique will be used where Happy Farm Seeder will be placed in tractor showrooms, where farmers can check the product. They will further communicate to other farmers, which will create awareness of the product.

Segmentation Strategy

Market segmentation is paramount for any product's success or failure. Before the launch of any product, it is important to know who are target customers and how should the market be segmented. In products like Happy Farm Seeder, the market must be properly segmented so that the product can easily pass its introductory and teething problems. One of the two segmentation strategiesfor Happy Farm Seeder will be based upon geographical area. This product is specially designed for rice chopping and is being designed in a way that it reduces the trend of crop burning. Rice is extensively grown in the central Punjab region, and central Punjab is the region where the crop residue is burnt, which caused hazardous situations for the environment and people.

Therefore, geographical segmentation will be done and the product will be launched and targeted to customers living in this particular area. Moreover, Segmentation of the product will be done based on geography and demographics. Middle to low-income groups of farmers will be targeted in the areas of the central Punjab region. Selective targeting strategy will be adopted,

where the machine will be placed in selective and main tractor showrooms of Lahore and Faisalabad.In case of the demographic segmentation, thiswill be based upon the income of farmers(Qaisrani, 2014). It is important to understand that the majority of farmers in this geographical area belong to low-income groups. As the target audience belongs to low-income groups, the market will be segmented based upon demography. In light of market segmentation, various tools will be used to make the product a success. A combination of geographical segmentation, as well as demographical segmentation, will be critical for the success of Happy Farm Seeder.

Target Market Strategy

Various targeting strategies are used to target the target audience. These strategies are critical for the success of the product. They include undifferentiated marketing, where the whole market has only one offer. This strategy is normally used in FMCGs, where the homogenous product is used and has to be consumed by the masses. Concentrated Marketing is used to target the audience in a way where concentration remains to one or very few segments or niches. Such a targeting strategy is used in luxury items. Micromarketing target strategy is also used local market is targeted along with individuals(Qaisrani, 2014).

Differentiated marketing is another target strategy that is widely used. It targets various segments in the market based upon the segmentation strategy of the product. In case of targeting customers of Happy Farm Seeders, it is important to use differentiated marketing target strategy. It will help target the market which was segmented in market segmentation. Exclusive Targeting will be adopted, where Happy Farm Seeder will be placed in main outlets of both the cities.Moreover, audience of Happy Farm Seeder is segmented based on demographics and

geography of the region. A differentiated marketing strategy will help the product get a better response from the audience.

Positioning Strategy

Another important measure for deployment of the Happy Farm Seeder is the positioning strategy considers strengths and weaknesses of the organization and product, and understands the customer needs along with market competition. Furthermore, it allows the management to spotlight those areas where their product can outshine and beat the competition. To position Happy Farm Seeder, it is important that its key features should be highlighted. The most effective key feature of this product is that it keeps the environment clean by avoiding stubble fire. However, in a market like Pakistan, this key feature may not create value for farmers, as they consider more economic aspects than environmental aspects. To position Happy Farm Seeder in a better way, it is critical to highlight its economic benefits to the target audience.

Moreover, the farmers would be communicated the economic aspects, and the savings they can make with every crop by using Happy Farm Seeder. Once they understand that they can roughly add PKR 40,000 with every crop, they will be able to perceive the product in a positive way. Better positioning can be done while pitching the economic benefits, and then the environmental benefits. All the emphasis should be placed on functional positioning of the product, and how it out beats the traditional ways of setting crops on fire(Iqbal, 2015). The positioning of the machine will be done in a way that the audience perceives it as a value addition in terms of monetary aspect. They should feel that by buying this machine, they will be able to save PKR 40,000 in every crop and an additional saving in a reduction of fertilizers by adding nitrogen, phosphorus, and potassium in the soil by using Happy Farm Seeder.

Better positioning of the product will have dual impact on the customers.Firstly, they will be able to save a considerable amount of money, and secondly, while saving money, they will be doing something favorable for the environment. Happy Farm Seeder has no significant competitor in the market, which will give it a leverage amongst its target audience. Better positioning can only be done if the economic features of Happy Farm Seeder are significantly highlighted. Low income farmers will be attracted to economic features, and environmental aspect will also be added into the fold.

SWOT Analysis

The analysis includes the combination of strengths, weaknesses, opportunities associated and the threats that come alongside this product. Since the Happy Seeder is new to the Pakistani market, it is necessary to highlight these factors which are as the following.

- **Strengths**

The happy seeder offers complete protection to the environment, thereby making positive changes in the ecosystem and an absolute end to the conventional way of farming i.e. burning of residues. Secondly, it enhances the yield production with little expense of fuel. Happy Seeder also accelerated the process of attractive pricing strategyespecially to influence the minds of low to medium income farmers.

- **Weaknesses**

The first main weakness is the preparation of the level field before using the product. The initial pricing of the Happy Seeder may not attract the farmers on tye whole and so the old traditional practices will continue to prolong. The product has to go major challenges in marketing it in the

eyes of the manufacturers. It will take a considerable time to develop the position in a positive way which will result in effective marketing growth.

- **Opportunities**

Happy Seeder has the ability to attract new investors and end users to discover its usage. It may become the first ever product in the field of green marketing. Through awareness campaigns, a huge market can be developed especially in the rural areas. A much more employmentopportunities can be observed that will heavily contribute in the prosperity of the state in terms of GDP. The incentives by the government would be a milestonefor the farmers to consider and avail the opportunity. In this way, a significant advancement in the agricultural sector can be expected.

- **Threats**

The first major threat to this product is the proper positioning of the product in the agricultural market. Secondly, a heavy competition among the manufactures can be expected. Happy Seeder can also face a disagreement in the eyes of the small scale farmers due to the incentives that might not reach them. A change in the government taxation policy can also affect the promotion of the product that might result in losses at the hands of manufacturers in marketing it.

Chapter 5: Action Plan

The happy farm seeders can be deployed to the farmers very effectively. The action plan will include the development of an online portal which will make the deployment process a transparent one for both the manufacturers and farmers (customer). The portal will be responsible for sending updates to the farmers regarding the delivery status of the machine, maintenance aspects or scheduling, pricing of the machine & accessories along with future upgrades. In this way, a real time information would be ensured and this will make both the farmers and manufacturers satisfied as everything would be properly documented. A quick service will be ensured whether it may be in the form of complaints or ordering a new product(Iqbal, 2015).

The happy seeder will be delivered through an online portal system where the customer/farmer can track the status of the delivery. The next thing to be done is to conduct the market analysis which will involve setting the target market and segmentizing it. In this case the target market will be the medium and small scale farmers. The farmer can choose the installment plan or on loan if he is unable to buy the product. Thirdly, the promotion will be done through social media marketing and broadcasting channels. With this plan it is possible that the promotion of this new technology will help to prevail the agricultural sector in a more efficient way. It would also help in providing new opportunities for our youth living in rural areas. The future of happy seeder in which according to many recent researches is that new modifications can be made to cater for other crops. It shall include the new designs of the openers and the metering system that would fulfill the sowing more effectively. Therefore, the happy seeder would shortly be able to revolutionize the agricultural sector.

Conclusion

It is essential to believe in the product by oneself, only then one can be able to effectively sell it to others. Happy Farm Seeder will not just give profits to its users, it will deliver them a value, which will be far long-lasting. The company wants the value of this product should reach the masses, and farmers should especially use this machine during the harvesting of rice. To facilitate customers, the company has placed the machine in regional hubs like Lahore and Faisalabad, from where it can easily be transported to local and rural areas. Price has been kept normal, with a cost-plus pricing strategy of a 10% profit margin, so that it should be in the financial reach of target customers. Moreover, additional to monetary benefit, they should also feel that they are doing something for the environment and entire humanity, which is a noble cause in itself.

In the wider aspect, it can be concluded that Happy Farm Seeder will be a revolutionary product in the market. Its impact on the food and agriculture industry will be massive. This product will result in the reduction of fertilizer consumption. This will have a dual impact. One, it will reduce fertilizer costs of farmers and the current account deficit of the country. Second, it will reduce the chemical footprint on food commodities, which will result in more natural food. These days people rely on those foods which are naturally grown, without the use of fertilizers and chemicals.

There is a growing trend of decreasing chemical footprints in foods. People are getting attracted to food and crops which are being grown naturally. Happy Farm Seeder will give this opportunity to thousands of farmers in Pakistan to reduce or eliminate fertilizers from their additives and produce natural crops. This will have a wider impact, locally as well as globally.

Pakistani rice is exported throughout the world. Once consumers will know that they are grown without any chemicals, the sales of Pakistani rice will increase.

Moreover, additional to monetary benefit, they should also feel that they are doing something for the environment and entire humanity, which is a noble cause in itself. Thousands of people die every year due to air pollution. Millions of people suffer from hazardous gases produced by crop burning. It is the more duty of farmers and the agriculture sector to take a stand against malpractices and crop burning. Pakistan is facing serious challenges in terms of pollution. Already the country has one of the lowest forest areas in the world. With natural cleansing already down, agriculture is increasing fuel to fire. The redundant practices are causing despair to millions of people living in nearby cities where the bad air traps.

In the wake of the coronavirus outbreak, it has been witnessed that lockdowns and halted agricultural activities cleansed the air immensely. It has been recorded that Lahore air quality was as clean as it was more than 30 years ago. Coronavirus pandemic is still prevalent and is taking hundreds and thousands of lives every day. It is a wake-up call for people to mend their ways. People must follow practices that are aligned with nature's system. Going against nature has grave consequences. If coronavirus pandemic can help cleans the air and make it comfortable for breathing, why can't humans take appropriate actions to do the needful? Why are people so reluctant to take necessary steps that can reduce air pollution? If this pandemic doesn't stop, and winters arrive, the smog will further deteriorate the situation.

This pandemic effect lungs and reduces oxygen levels. Smog and increased air pollution also impact the lungs and reduces their functionality. Coronavirus pandemic, combined with the smog of winters will have horrific results for the citizens of Pakistan. Farmers should take it as

their grave responsibility to challenge air pollution and combat climate change. They have a bigger role to play in the overall global challenge of air pollution. Happy Farm Seeder will be a product for them which will equip them to take up this challenge. This product will not only support them in monetary terms by increasing their yield, but it will also help them in their drive of becoming a responsible citizen of not only this nation but also of the world.

Appendices


اپنی آمدنی میں
اضافہ کریں!!
• آپ ہر فصل میں کم سے کم 40000 تک منافع کما سکتے ہی
• کھاد کی ضرورت کم
• زمین کی پیداوار میں اضافہ
• مشین تنکے کو کاٹ سکتی ہے جسے جانوروں کے چارے کے طور پر استعمال کیا جاسکتا ہے
ہیپی فارم سیڈر
• سبسڈی پر دستیاب ہے
• سبز اور صاف ستھرا پاکستان کی طرف اہم قدم
جب ہوگا
خوشحال کسان
پھر ہوگا
خوشحال پاکستان

References

Ahmed, W. T. (2019). Addressing environmental implications of crop stubble burning in Pakistan: innovation platforms as an alternative approach. *International Journal of Global Warming, 19*((1-2)), 76-93.

B. R. Kamboj, M. J. (2013). *Operational Manual for Turbo Happy Seeder.* International Maize and Wheat Improvement Centre (CIMMYT).

Hafiz Mujeeb ur Rehman, S. A. (2011). Resource conservation strategy for enhancing wheat productivity in Pakistan. *Mycopath, 9*(2), 79-85.

Iqbal, M. A. (2015). In Pakistan, agricultural mechanization status and future prospects. *American-Eurasian Journal of Agricultural & Environmental Sciences, 15*(1), 122-128.

Qaisrani, S. A. (2014). Cost Analysis on Wheat with Operational Time and Fuel Ingestion of Different Tillage Practices in Rice-Wheat Cropping System of Punjab, Pakistan. *Pakistan Journal of Life & Social Sciences, 12*(2).

R.P. Singh, H. D.-S.-S. (2008). Economic evaluation of the Happy Seeder for rice-wheat systems in Punjab, India. *AARES 52nd Annual conference, Canberra, ACT, Australia.*

Singh, A. K. (2013). Farmer's participatory approach for the in-situ management of paddy straw with happy seeder and rotavator. *International Journal of Agriculture Innovations and Research, 2*, 178-185.

Rehman, S. (2019). Pakistan's Rising Air Pollution Crisis. Retrieved 25 December 2019, from https://thediplomat.com/2018/08/pakistans-rising-air-pollution-crisis/

Irfan, M., Riaz, M., Arif, M. S., Shahzad, S. M., Saleem, F., van den Berg, L., & Abbas, F. (2014). Estimation and characterization of gaseous pollutant emissions from agricultural crop residue combustion in industrial and household sectors of Pakistan. *Atmospheric environment, 84*, 189-197.

Pathak, H., Singh, R., Bhatia, A., & Jain, N. (2006). Recycling of rice straw to improve wheat yield and soil fertility and reduce atmospheric pollution. *Paddy and Water Environment, 4*(2), 111.

Cohen, A. J., Brauer, M., Burnett, R., Anderson, H. R., Frostad, J., Estep, K., ...&Feigin, V. (2017). Estimates and 25-year trends of the global burden of disease attributable to ambient air pollution: an analysis of data from the Global Burden of Diseases Study 2015. *The Lancet, 389*(10082), 1907-1918.

PTV Home most viewed: Gallup Pakistan - Journalism Pakistan. (2019). Retrieved 28 December 2019, from http://www.journalismpakistan.com/news-detail.php?newsid=664

Happy Farm Seeder

ORIGINALITY REPORT

3%	1%	0%	2%
SIMILARITY INDEX	INTERNET SOURCES	PUBLICATIONS	STUDENT PAPERS

PRIMARY SOURCES

1	Submitted to Higher Education Commission Pakistan Student Paper	2%
2	pdf.usaid.gov Internet Source	<1%
3	unep.org Internet Source	<1%
4	Witold Lipski, Christos H Papadimitriou. "A fast algorithm for testing for safety and detecting deadlocks in locked transaction systems", Journal of Algorithms, 1981 Publication	<1%
5	trap.ncirl.ie Internet Source	<1%
6	www.itssa.org Internet Source	<1%

Exclude quotes On Exclude matches Off