

## Turkey's Demand for Agricultural Tractors and Machinery

Çağdaş Civelek<sup>1</sup>

<sup>1</sup>Çukurova University, Faculty of Agriculture, Agricultural Mechanization and Technologies Engineering Department, 01330, Adana, Turkey

### \*Corresponding Authors

**Name:** Çağdaş Civelek

**Email:** [cagdascivelek@gmail.com](mailto:cagdascivelek@gmail.com)

---

**Abstract:** With the improvements in agriculture which is the heart of the modern industry, increasing agricultural activities have improved agricultural mechanization park and machinery production industry of Turkey in the last 25 years. The main object which helps the improvement of the agriculture is developments in agricultural mechanization and adaptation to the technology. Along with small and medium sized enterprises' productions, credit sales that supported by the Turkish government have the biggest support to let the agricultural mechanization to spread wide. The agricultural mechanization of Turkey which had been dominated by foreign companies for 25 years has become to support Turkey's domestic economy. In this research Turkey's agricultural tractor and machinery park was discussed.

**Keywords:** Agricultural mechanization, tractor, agricultural statistics

---

### INTRODUCTION

From 1980s Turkey's agricultural production has had acceleration and this situation made an increase in agricultural machinery usage. The improvements were not only for the agricultural machinery and implements but also in the production area of tractors which propels these machines. Today there are many companies that produce in different types and power sizes of tractors and nearly 1.6 million tractors are being used in Turkish agriculture. However high fuel prices, labor, maintenance and production expenses are the main constraints for Turkey's agricultural production. Today whereas precision farming and other new technology agricultural production techniques very popular all around the world, there is a long way for Turkey's agricultural machinery sector to achieve expected levels. To achieve this, analyzing of agricultural mechanization by using statistical data for tractors and machinery has an enormous importance for making provisions and future plans.

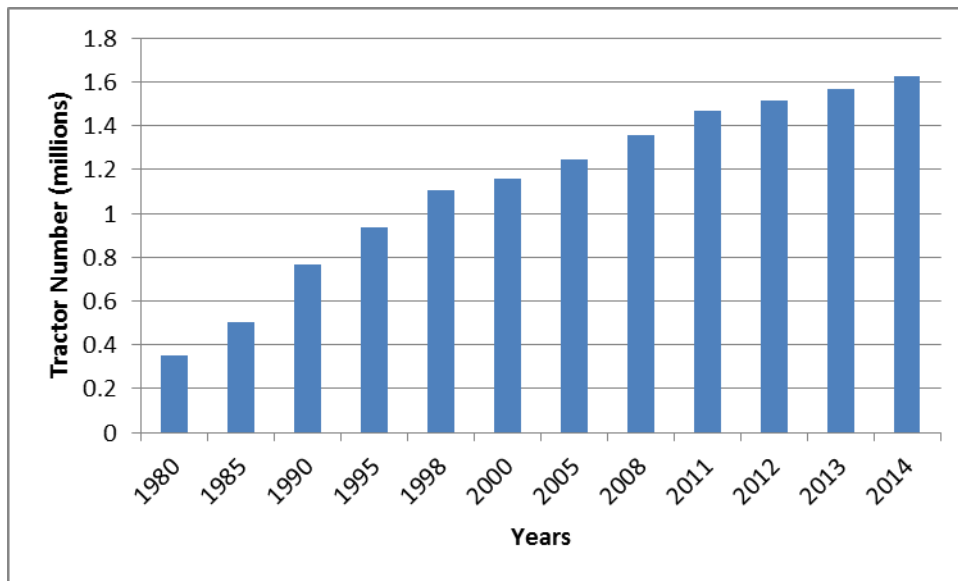
### RESEARCH METHODS

In this research statistical data published by Turkish Statistical Institute, Turkish Automotive Manufacturers Association and Turkish Association of Agricultural Machinery and Equipment Manufacturers was used to make calculations and analyses to discuss Turkey's agricultural tractor and machinery park. Tractor and machinery number changes by year, tractor park average age, tractor exporting data and combine

harvester number changes by year were analyzed and plotted. Also, agricultural machinery indicators were also calculated using gathered data.

### RESULTS

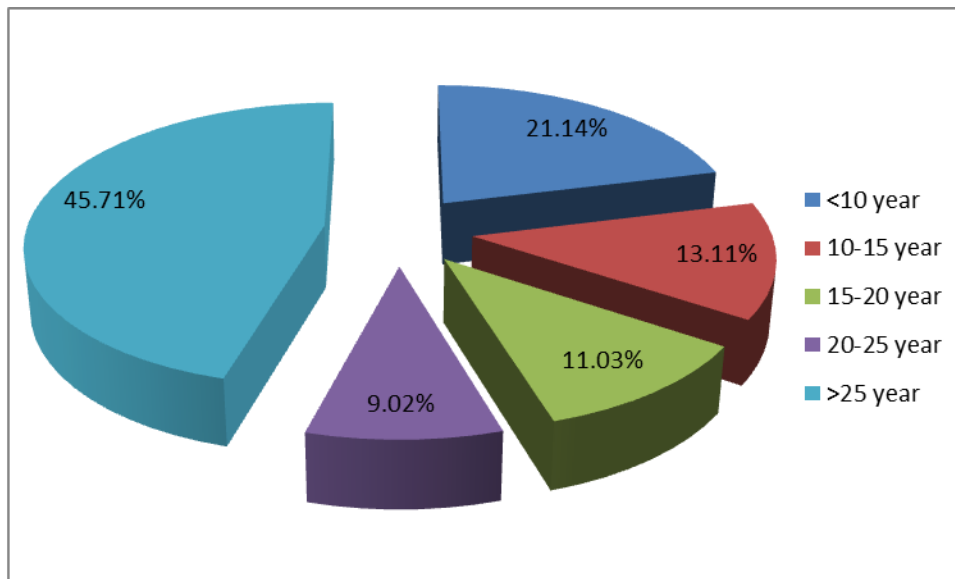
From 1980's Turkey's tractor market has started to grow up very fast with the developments in agricultural production. In 25 years total number of tractors has increased by more than 3.5 times. Turkey as a developing country, according to the 2014 statistical reports there are 1,626,938 registered tractors [1] (Figure 1). But according to Turkish Statistical Institute 1,243,300 of those tractors are being used [2]. From these results it is understood that more than 380,000 of those tractors are not being used. The biggest problem is tractors' average age is very high. Also it is determined that 45% of total tractors' economic life is over (Figure 2). This situation reduces agricultural production activity whereas increases fuel usage costs and greenhouse gas emissions because of old technology engines. By low unregistered tractor numbers in a year, it can be seen that old tractor usage is still very high. The importance of the use of new tractors comes up with the scope of tractors' new technology engines and specifications which reduces engine emission levels and time loses on the field. Since new technology tractors have benefits like electrically controlled mechanisms, GPS guidance systems and ISO-Bus systems, the importance of changing old tractors with the new ones becomes urgent.



**Fig- 1: Tractor number changes by year [1]**

However total economical working hour of a tractor is 12,000 hours, average total working hour of a tractor is 600 hours in Turkey. This situation not only proves that 600 hours of annual usage is not enough and most of the tractors are inactive but also shows that precautions are not acceptable that are taken for the consolidation of fragmented land by the government.

Also, it shows that most of the tractors are far beyond today's technological advances and not suitable for today's advanced agricultural techniques like precision farming. Using of these tractors will result in high fuel usage, extended working hours, extra labor costs that means less production and profit.



**Fig-2: The number of tractor age rates by year [3]**

The number of tractors has increased 34% in the last 10 years, but obviously average tractor number could not reach this level despite increment of average power to 44.93 kW by 5% (Table 1). Decrease in total agricultural area and expanding of fragmented land have prevented agricultural production to achieve expected levels.

not achieved for average tractor power which is 44.93 kW with an increment of 5%. However decrement of arable land makes necessary increment of yield per area, opposite to this situation average power per area was not increased and fragmented agricultural area problem has not been solved. As a result of this agricultural production has not been reached to an acceptable level in Turkey.

However in the last decade tractor number has increased by 34%, it can be seen that this increment was

**Table 1: Changes in agricultural machinery indicators for 10 year period**

Year	Tractor Number	Total Power (kw)	Average Tractor Power (kW)	Arable Land (bin ha)	kW/ha	Tractor/1000 ha	ha/Tractor
2004	1,210,283	57,671,098	42.71	26,593	2.17	45.51	21.97
2014	1,626,938	71,868,416	44.93	23,939	3.00	67.96	14.71

In 2014 Turkey's tractor registration number was 62,732 whereas unregistered number was 1,841 (Table 2). For making comparison by looking at the numbers in Europe, 36,611 tractors in Germany, 33,127 tractors in France, 18,176 tractors in Italy and 175,000 tractors in European Union were registered in 2014 [4].

However more than 45% of Turkey's tractor park is over 25 years old, unregistered tractor number rate versus registered ones is nearly 3%. This result shows that there is not enough encouragement for farmers to unregister these old machines.

**Table 2: Changes in tractor registration by year [5]**

Registered and Unregistered Tractor Numbers				
Years	Registered Tractor Number	% of Total Tractors Used	Unregistered Tractors	% of Total Tractors Used
2004	31,113	3.8	982	0.3
2005	40,724	3.9	3,240	4.1
2006	45,460	3.9	2,548	3.7
2007	38,417	4.5	1,762	2.6
2008	33,477	4	2,234	2.6
2009	17,002	2.4	7,547	4.6
2010	38,249	4.1	1,409	0.9
2011	62,635	5.3	1,299	0.6
2012	52,123	3.4	2,910	0.1
2013	53,803	3.4	3,482	0.2
2014	62,732	3.8	1,841	0.1

The number of tractor factories has increased parallel to industrial achievement in Turkey. By the end of 2015 there are 8 tractor factories in Turkey [6]. Moreover these firms are getting capable of exporting their products all over the world. Totally 48,403 tractors

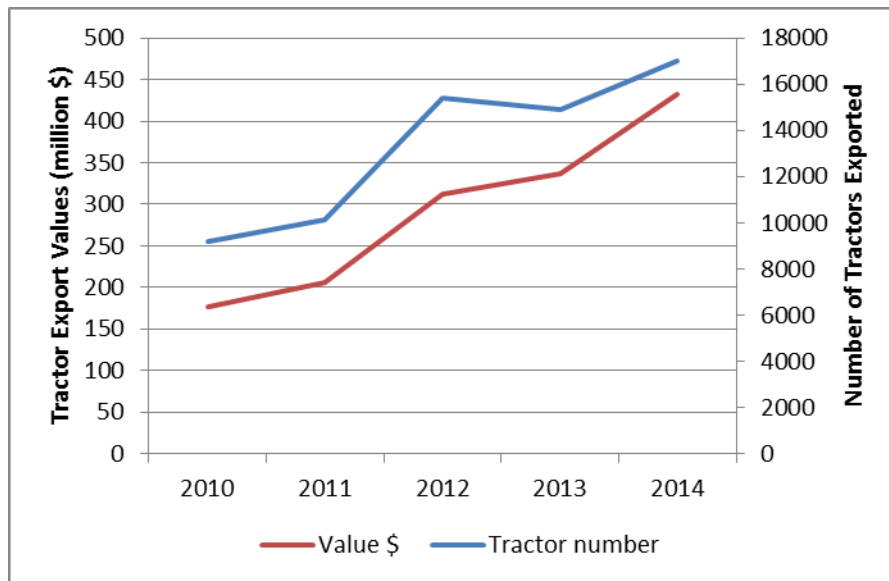
were produced in 2014, 30,973 of them (64%) were sold domestically and 17,430 (36%) of them were exported. Also exported tractor number in 2012 was the highest for the last 10 years (Table 3).

**Table 3: Number of tractor production by year in Turkey [1]**

Year	Number of Produced Tractors by Year	Number of Total Domestic Sales
2004	40,665	27,925
2005	36,527	27,008
2006	38,841	28,386
2007	33,518	24,041
2008	24,807	14,621
2009	14,861	7,290
2010	30,425	21,390
2011	45,506	34,723
2012	42,255	27,523
2013	40,509	25,794
2014	48,403	30,973

Turkey's tractor export data shows that number of tractors and the total exportation value were increased year by year. At the end of 2014, 17,000 tractors at a value of 432.6 million \$ were exported (Figure 3) [1]. Since 48,403 tractors were produced in

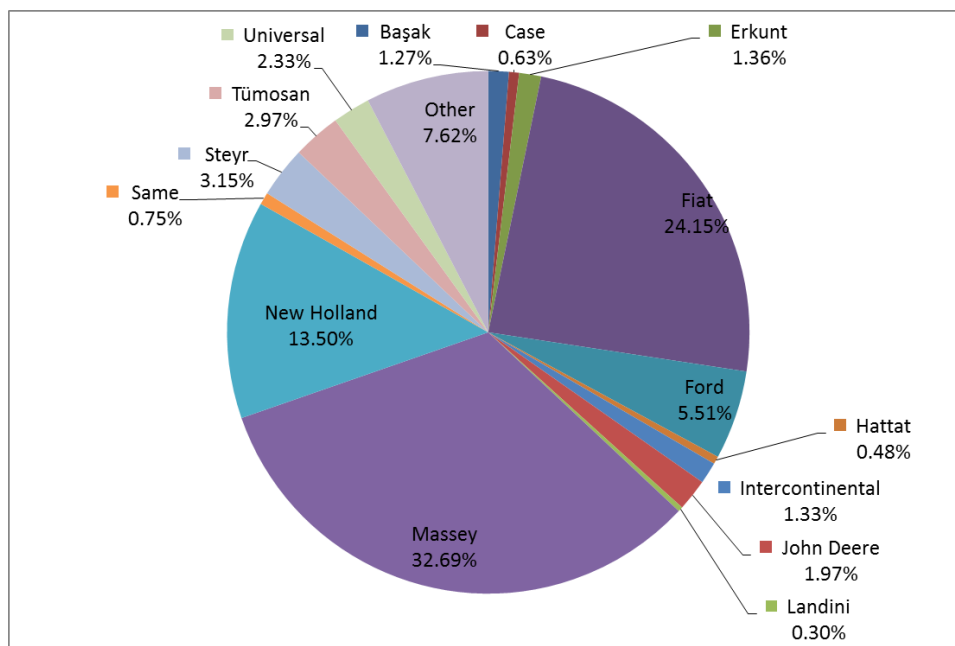
the same year, this makes over 35% of total tractor production. These results show that Turkey's tractor exportation has an effective contribution on general economy numbers.



**Fig-3: Turkey's tractor exporting data [1]**

In Turkey nearly 30 firms still continuing economic activities in agricultural tractor market[6]. Agricultural tractor usage rate by brand is shown in Figure 3. Taking into account that Fiat and New Holland brands are sold by Turk Traktor Company, the

most used tractor brands in Turkey are Fiat, New Holland and Massey Ferguson with more than 70% (Figure 4). According to the statistical data, every 89 tractors of 100 were farm tractor and 11's were orchard tractors.



**Fig-4: Rates of tractor brand usage in Turkey [7]**

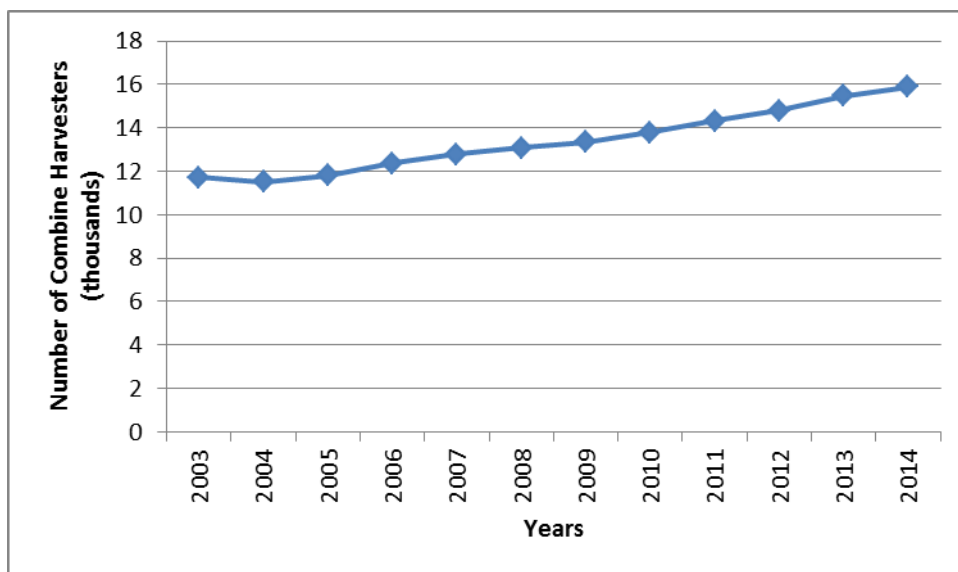
By means of implement number used with a tractor is 0.725 for trailers, 0.152 for disc harrow, 0.688 for moldboard plough and 0.06 for sewing machine. It is seen that trailer, moldboard plough and sewing machine number per tractor is decreased by comparing the data for 2007. It is thought that this situation may have occurred because of new tractor number was increased whereas old tractor number stayed the same. Moreover, fragmented area problems might have caused a difficulty in increment of mean tractor power,

implement number per tractor and implement working width.

By looking at combine harvester number change in the last decade 28% increment can be seen (Figure 5). Increment of combines between 0-5 ages by 10% and decrement of combines over 21 year old from 40% to 28% resulted in higher reliability and decrement of harvesting losses. Since cereals are the main products for agriculture and raw materials of main products, this

result has a very big importance to cut down off imports. As a type of common usage model, combine entrepreneurs are getting very common and the

necessity of buying a combine for each farmer is getting low. It is thought that this situation resulted in decrement of combine harvester age.



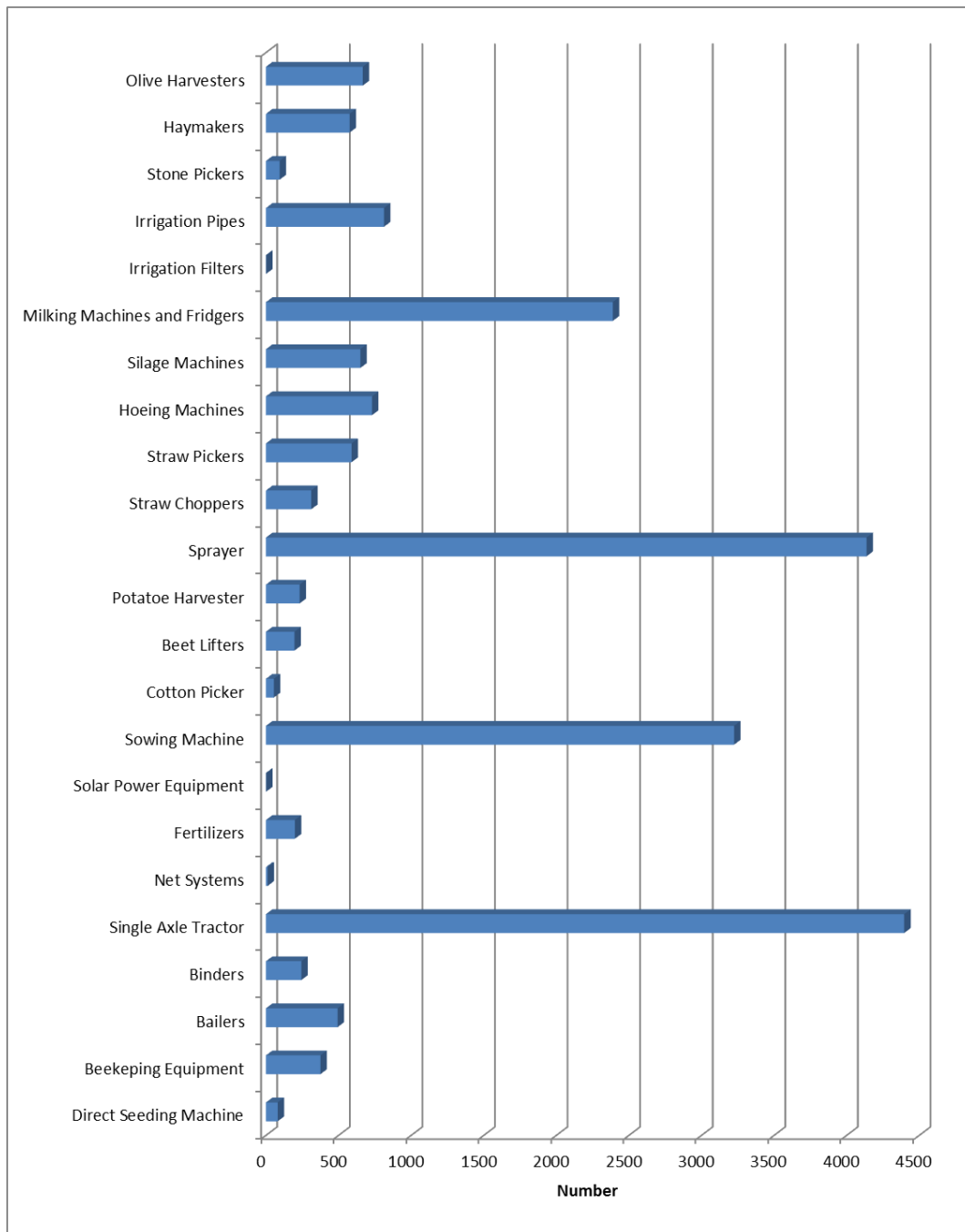
**Fig- 5: Change in number of combine harvesters in Turkey [8]**

Rural development supports were given by Republic of Turkey Ministry of Agriculture, Food and Livestock from 2007 and it was increased in every year resulting in cheaper machinery buying opportunities for farmers and younger machinery for Turkey's agricultural machinery park (Table 4). These supports also made a positive change in Turkey's agricultural machine production companies' number and production technology. Increment of demand for new machines not only resulted in more competitive and technologically developed agricultural machinery companies but also

more technologically developed machines to be imported. With these supports Turkey's farmers were able to buy new machines 50% cheaper and stopped using old machines which were at the end of economic lives. Especially sewing machine, sprayers and single axle tractors were the most supported machines (Figure 6). However rural development support for agricultural machinery was resulted in development of agricultural production, these supports were cut off by year 2015 and it is expected rural development supports to be started in 2016.

**Table 4: Total price of rural development support by year in Turkey [9]**

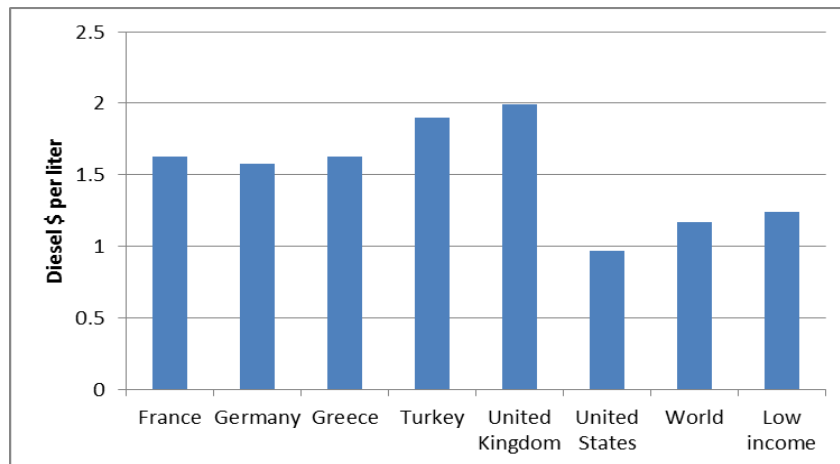
Support Year	Number	Support Amount (TL)
2007	2,992	42,055
2008	9,357	68,739
2009	28,921	128,587
2010	36,855	109,715
2011	82,436	275,720
2012	20,498	93,456
<b>Total</b>	<b>181,059</b>	<b>718,272</b>



**Fig-6: Machine types getting highest rural development support in 2012**

By the point of sustainable agricultural production these supports were not enough. Besides supports, problems in traceability of these machines result in development of agriculture to stay under expected levels. Because of increasing fuel prices and debts, farmers have difficulty in agricultural production activities. Diesel fuel price is still very high in Turkey

not only compared to other European countries like Germany, France and Greece but also compared to whole World and countries with low income level (Figure 7). This situation along with high fertilizer, labor and maintenance costs are making agricultural activities more and more difficult for Turkey's farmers.



**Fig-7: Diesel fuel prices for different countries in 2014 [10]**

## DISCUSSION

However tractor and machinery numbers have increased, decrement in agricultural area size and fragmented land are foregoing problems for Turkey's agriculture. Although new tractors have been used, not only most of the tractors in Turkey's tractor park are over 25 years old but also they have not completed economical usage time which is 12,000 hours. Also, farmers are still continuing to buy new tractors. Therefore, farms' profitability is generally less than expected and farmers are having difficulty to pay credits that they are taking from banks.

With the rural supports farmers had the opportunity to buy new technology machinery. As a result of this, increase in yield, decrease in machinery break down time and repair costs has been achieved. Since supports were ended by the year 2015, traceability and sharing of the machines that were bought using rural supports have an important role for sustainable agriculture. However combine harvester contractors are very common, sharing of the agricultural machinery has not grown up in Turkey. While precision farming is getting very common and internet of things era has begun, those concepts could be a solution for traceability.

## CONCLUSION

Turkey's agriculture had a lot of achievements from 1920's till 2016. Agricultural machines have the highest investment cost of a farm and agricultural machinery park should be selected properly for profitable farming activities so, Turkey's agricultural production can achieve expected levels. Also, with selecting and using optimum machines for farming activities farmers can struggle with high fuel and other production input prices. With the end of rural supports for machines, the most important point for now is to encourage farmers to double up agricultural machines instead of buying new ones. On the other side, a support for scrap machinery that would have given by Ministry could be a solution to achieve expected agricultural machinery technology.

## REFERENCES

1. OSD, 2015. Turkish Automotive Industry Association, General and Statistical Information Bulletin of Automotive Manufacturers. Available from <http://www.osd.org.tr/raporlar>
2. TÜİK, 2015. Agricultural Equipment and Machinery Statistics. Available from [http://www.tuik.gov.tr/PreIstatistikTablo.do?istab\\_id=305](http://www.tuik.gov.tr/PreIstatistikTablo.do?istab_id=305)
3. TÜİK, 2015. Agricultural Equipment and Machinery Statistics. Available from [https://biruni.tuik.gov.tr/bitkiselapp/tarimalet\\_ing.zul](https://biruni.tuik.gov.tr/bitkiselapp/tarimalet_ing.zul)
4. VDMA, 2015. VDMA Agricultural Machinery Report. Available from <http://lt.vdma.org/documents/105903/8575467/VDMA%20Economic%20Report%202015%20public%20version.pdf/a25a564f-614e-4e67-95f2-6f16b7604f9b>
5. TÜİK, 2015c. Road Motor Vehicle Statistics. Available from <https://biruni.tuik.gov.tr/medas/?kn=89&locale=tr>
6. TARMAKBİR, 2015. Sector Report – Turkish Association of Agricultural Machinery and Equipment Manufacturers. Available from <http://www.tarmakbir.org/haberler/tarmakbirsekrap.pdf>
7. TÜİK, 2014. Road Motor Vehicle Statistics. Turkish Statistical Institute, Printing Division, Ankara, TURKEY.
8. TÜİK, 2015. Agricultural Equipment and Machinery Statistics. Available from [http://www.tuik.gov.tr/PreIstatistikTablo.do?istab\\_id=1079](http://www.tuik.gov.tr/PreIstatistikTablo.do?istab_id=1079)
9. ANONYMOUS, 2013. Kırsal Kalkınma Yatırımlarının Desteklenmesi Programı-2013. Republic of Turkey Ministry of Food, Agriculture and Livestock.
10. THE WORLD BANK, 2015. Available at <http://wdi.worldbank.org/table/3.13#>