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## Perspectives of soybean production development in Ukraine

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## 1. Introduction

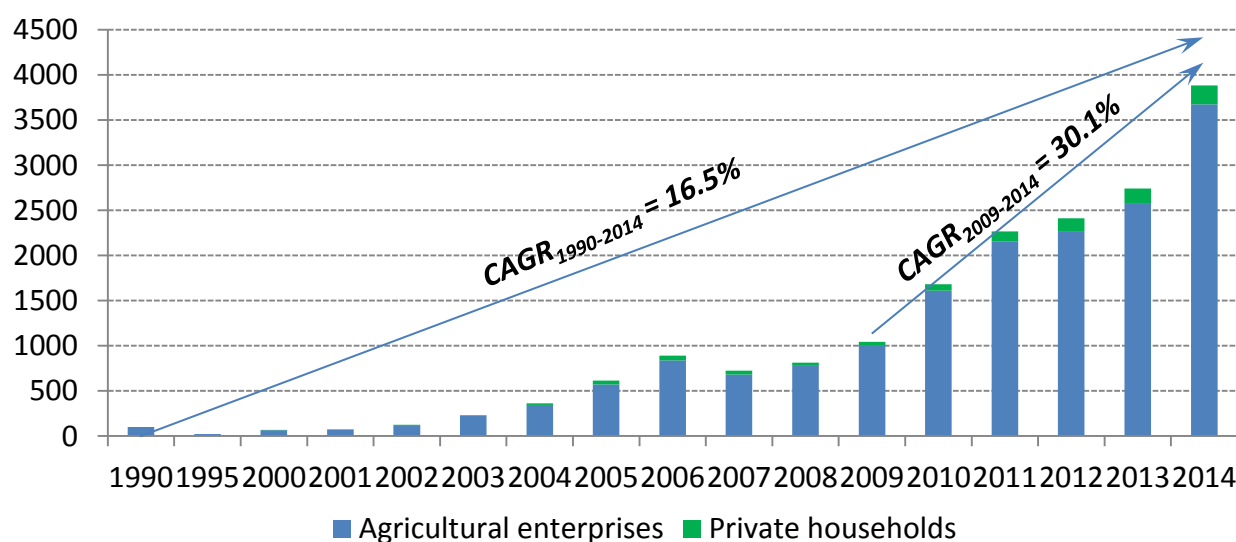
Niche crop production is pretty popular topic nowadays among agricultural specialists. The increase of industrial crops production in world led to profitability decrease even due to improvements in field of resource efficiency. On the Ukrainian example we could highlight the transition of soya from the position of niche culture to industrial in terms of production volumes. In 1990 this culture had a share of 0.3% only in total sowing areas of agricultural enterprises and the gross harvest was equal to 99 tsd tonnes. In 2015 soya already has a share of 11% in total sowing areas of agricultural enterprises and there is a high probability of further growth.

## 2. Data and Methods

The data for further analysis (sowing areas, yields and gross harvest) were collected from the sources of official state statistics – State Statistic Service of Ukraine. Other indexes were calculated by the authors of this abstract or were taken from publications of Ukrainian experts, business or scientific society. Forecasts are based on trending approach and expert analysis.

## 3. Results

Soybean production development in Ukraine is illustrated at the figure 1. From this chart we can see that growth was driven by profit-aimed entities - agricultural enterprises, while private households had harvested 5-15% of soya for last few years. The rapid increase of production was observed during last 5-6 years: CAGR<sup>1</sup> for the period of 1990-2014 was equal to 17%, while in 2009-2014 – more than 30%.



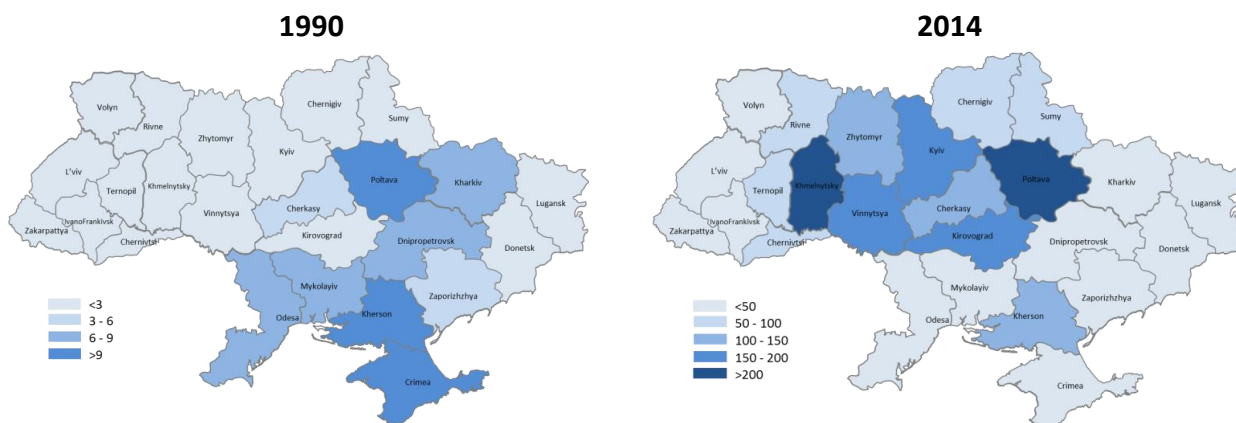
**Figure 1. Gross harvest of soybean by group of market entities, 1000 t**

*Source: State Statistic Service of Ukraine, own calculations*

Increase of gross harvest was possible due to increase of sowing areas and yield. In 2014 total area under soybeans was at the level of 1.8 million ha (in 2015 - 2.1 million ha) that was 20 times higher than in 1990. The geography of production has changed for past 25 years significantly (figure 2). If in 1990 main oblasts by area under crop were: Kherson (10.4 tsd ha), Crimea (10.2 tsd ha), Poltava (9.8 tsd ha), Kharkiv (9.2 tsd ha) and Mykolayiv (8.7 tsd ha) that represents South and Central-Eastern part of Ukraine, than in 2014 main production regions were located mainly on the Central part of Ukraine: Khmelnytsky (225.5 tsd ha), Poltava (206.3 tsd ha), Kyiv (189.2 tsd ha), Vinnytsya (164.9 tsd ha) and Kirovograd (150.2 tsd ha) oblasts. These changes were caused by few factors: climate change, deterioration of irrigation systems which were located at Southern regions of Ukraine, development of production technologies and production resources improvement etc. Another one important factor is that 25-28% of soya produced by agricultural holdings during last years. In particular in Khmelnytsky,

<sup>1</sup> Compound annual growth rate.  $CAGR = \left( \frac{\text{Ending value}}{\text{Starting value}} \right)^{\frac{\text{No of periods}}{2}} - 1$

Poltava, Zhytomyr, Vinnytsya and Cherkasy oblasts large production volumes (30-55%) were provided by vertically integrated structures.



**Figure 2. Sowing areas of soybeans in Ukraine, 1000 ha**

*Source: State Statistic Service of Ukraine*

Talking about the place of soybeans among the other crops, we should also mention that in Khmelnytsky and Chernivtsi oblasts 1/5 of total sowing area of agricultural enterprises was under soybeans in 2014, in Kyiv oblast – 17%.

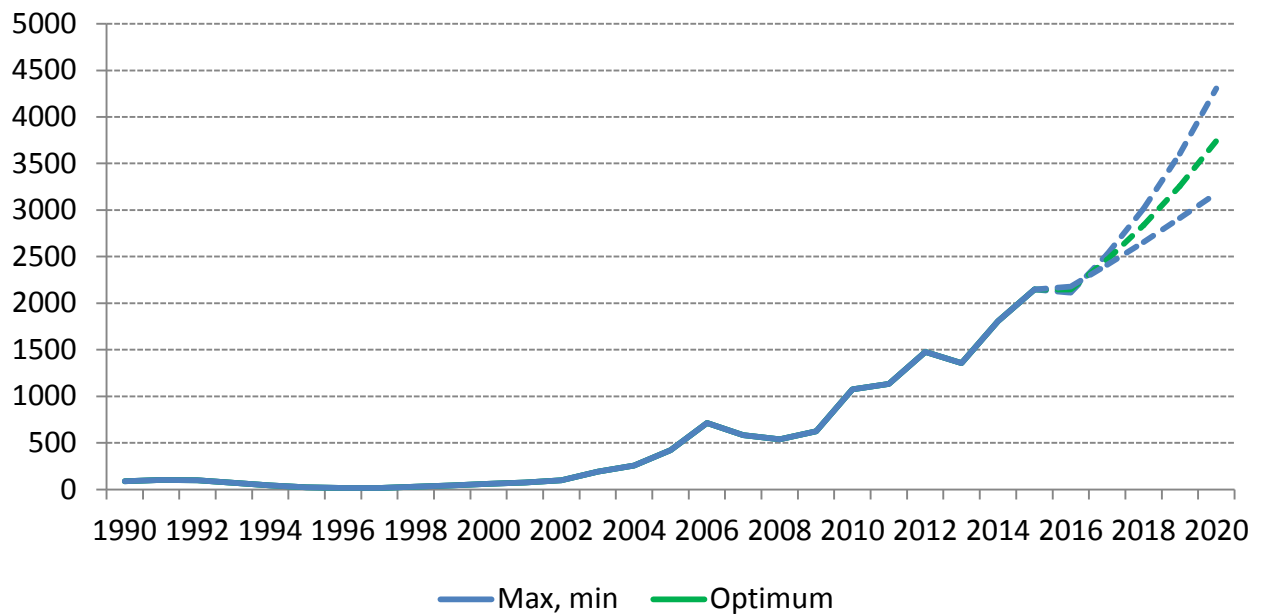
Yield increase also had an important influence on volumes of production. It has increased in 2 times for last 25 years on average (annual increase (CAGR) was equal to 2.7%), but still Ukrainian average yield is 27% less that in the European Union. Comparing to the other counties in the world, in 2014 our country was at the 16th place by the yield (25th in case of counting all the EU countries separately).



**Figure 3. Dynamics of soybean yield, dt/ha**

*Source: State Statistic Service of Ukraine*

Using the trending and expert analysis we were calculated few possible variations of sowing areas under soybeans increase (figure 4). On the figures below we are presenting three scenarios: minimum, optimum and maximum. Minimal scenario indicates further expand of sowing areas under this crop to 3.2 million hectares till 2020 that is 48% higher than in 2015, maximum – increase to 4.3 million hectares that is 2 times higher than this year.

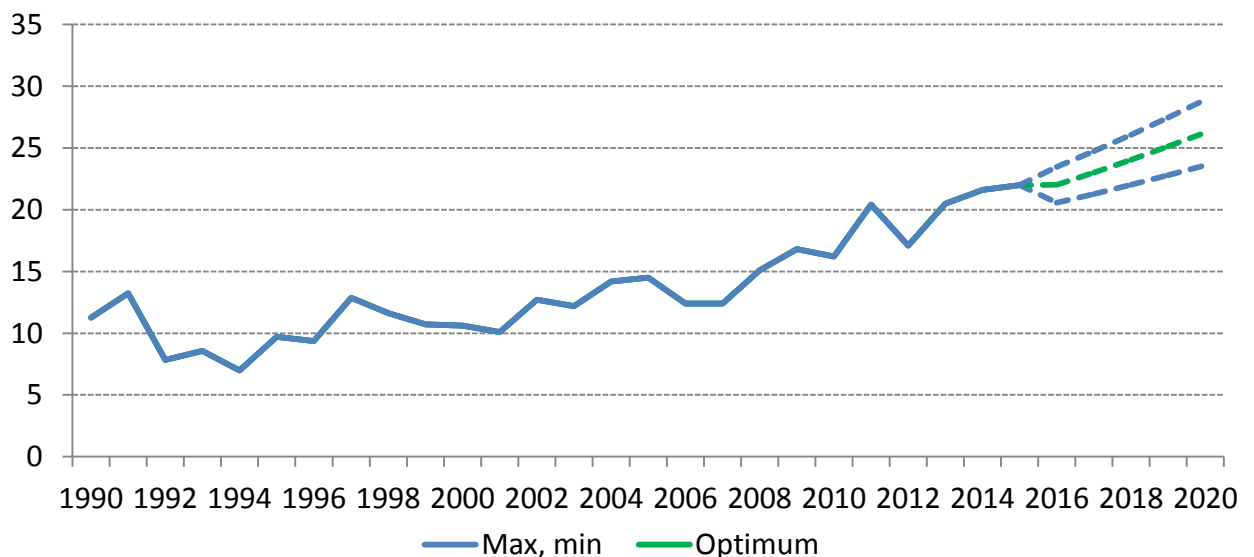


**Figure 4. Dynamics and forecast of sowing areas under soybeans, 1000 ha**

*Source: State Statistic Service of Ukraine, own calculations*

Mainly Ukrainian model of sowing areas management become more similar to the model in the USA (dominant position of soybean and corn by the sowing areas), in which farmers decide what to produce based on expectation on marginality of these two crops.

Based on yield dynamics, we are expecting further growth of this value in Ukraine till 24-29 decitonnes per hectare that is 9-32% more than during the last harvesting season respectively.

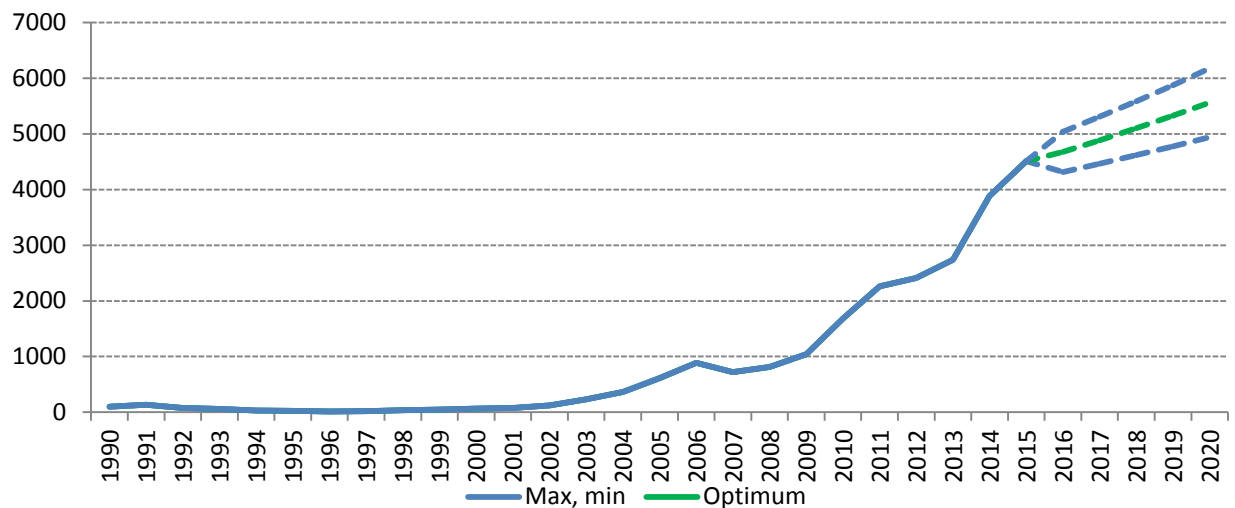


**Figure 5. Dynamics and forecast of soybean yield, dt/ha**

*Source: State Statistic Service of Ukraine, own calculations*

In historical dynamics we see the increasing trend, but current economic problems, limited access to external financial resources and correction of investment plans (including technological improvement) could cause short-term gap and further growth of average yield in Ukraine.

Finally we get forecast of soybeans gross harvest by consolidation of two abovementioned values. On our opinion till 2020 Ukrainian farmers could produce from 4.9 to 6.2 million tonnes of soya that is from 9 to 38% more than now respectively.



**Figure 6. Dynamics and forecast of soybean gross harvest, 1000 t**

*Source: State Statistic Service of Ukraine, own calculations*

There are possible factors that could cause deviation from the illustrated development. Most probable among them are: rapid change of conjuncture on a global market caused by high volumes of export by leading countries, unfavorable legislation changes in Ukraine (e.g. cancelation of VAT accumulation or preferential taxation system) or economic instability in general.

#### 4. Conclusions

Ukraine has great potential in crop production, but it is not fully used. Potential of further increase of soya production volumes are dictated by large amount of factors, demand on global market, favorable climate conditions and so on. Profitability of soybeans was also relatively higher than profitability of “queen of Ukrainian fields” (corn): 16% in 2013 and 35% in 2014 versus 2 and 26% respectively. Profit per hectare in case of soya production was 8 times higher in 2013 (969 UAH) and 5% higher in 2014 (2621.4 UAH) that makes it favorite among the Ukrainian producers.

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