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**Conference Paper**

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**Provided in Cooperation with:**

The Research Institute for Agriculture Economy and Rural Development (ICEADR), Bucharest

*Suggested Citation:* Crudu, Georgiana; Toma, Marin (2013) : From the experience of SC TOMA SRL Călărași county on autumn rape crop technology, In: Agrarian Economy and Rural Development - Realities and Perspectives for Romania. 4th Edition of the International Symposium, November 2013, Bucharest, The Research Institute for Agricultural Economy and Rural Development (ICEADR), Bucharest, pp. 202-206

This Version is available at:

<https://hdl.handle.net/10419/111587>

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## FROM THE EXPERIENCE OF S.C. TOMA S.R.L. CĂLĂRASI COUNTY ON AUTUMN RAPE CROP TECHNOLOGY

GEORGIANA CRUDU<sup>1</sup>, TOMA MARIN<sup>2</sup>

**Abstract:** *The company SC TOMA LTD is wholly owned private capital company, created and operating under the Law 31/1990. The company is located in Modelu commune, Calarasi county having in operation currently an area of 360 hectares of arable land. The technology represents all methods and procedures used for obtaining the particular product. The term technology refers to both the technical aspects and the economic ones, transposing them into practice. In fact the technology has two distinct sides or distinct parties in interdependence: the technical side and the economic side. The technical side is considering the means and works to provide conditions for plant growth and development according to their requirements in order to obtain higher productions per unit area. The economic side aims the parameters of efficiency of the technology both on each segment or link of it, as well as a whole.*

**Key words:** *technology of rape crop, rapeseed varieties and hybrids, bio stimulator, average productions, selling prices*

### INTRODUCTION

The rape now occupies an important place in the global economy as a source of vegetable oil. In the world, the rape is grown on an area of over 27 million ha. The biggest cultivators are China with 7.2 million ha and India with over 6.9 million ha, followed by Canada with 5.1 million ha, Germany with 1.3 million ha, and France with 1.2 million (Pirná I, 2011[1]). In Romania, the rape was cultivated on 392 700 ha in 2011, the 97 100 ha in 2012 (surface destroyed was 324 thousand ha (77%) [3]).

The rape seeds contain 42-48% oil used both in food and in the preparation of margarine and in industry and transport. In recent years from the rapeseed oil bio diesel is extracted used for diesel engines operation. This bio fuel has big advantages compared to fossil fuels because it is not polluting, is renewable and has a competitive price with fossil fuels. Added to this, there are multiple phyto advantages: it is sown and harvested outside the critical periods, against the grain, they react favourably to fertilization, allowing full use of the same set of machines as grain; it can be used as an excellent prior for successive crops or for autumn grains; it raises the soil fertility and it prevents the erosion on slopes, it is a good honey plant; the cakes are high in protein (38 to 41.9%), carbohydrates (31.5 to 36%) and minerals (8 to 9.8%), thus having good feed value.

### MATERIALS AND METHODS

In order to approach the issue as working methodology, the method of structure indicators, was used which was based on the measuring technologies of the analysed phenomena. We determined in terms of physical aspect and value the indicators (crop areas, average yields, delivery prices of production, total value of total production and per hectare), indices (the ratio of the two indicators for determining the production per hectare, the price of delivery, of the production value).

The data analyzed and interpreted from the technical and economic specifications with observations from the farm and studied specialised literature.

The comparisons aimed for 6 years, respectively 2008-2013. The annual variation of the levels of achievement of the indicators analyzed could result in relevant interpretations, which were able to delimit the factors that caused the deviation size.

## RESULTS AND DISCUSSIONS

The main soil types in the company are brown chernozem and grey chernozem. The agrochemical study conducted at S.C TOMA SRL [5] recorded the following: on an area of 7 hectares (1.9%), the soil reaction is slightly acidic on 33 ha (9.1%) is neutral and the 330 ha (91%) is slightly alkaline; the supply with phosphorus is average 25.8% (93 ha), good in 62.5% (225 ha) and very good on 7.5% (27ha) the potassium supply on average 6% (21 ha), good 31% (114 ha) and very good in 63% (235 ha) nitrogen supply is poor in 5% (19 ha) and average on 95 % (351 ha). The study shows that soils are favourable for rape crop.

Compared to the very harsh climate with hot dry summers and very cold winters with blizzards, the rape, however, presents some disadvantages of the sensitivity to drought during sowing period, the alternation of freezing and thawing in spring and frost during the bud flowering (Pimă I, 2011).

Year	2008		2009		2010		2011		2012		2013	
	ha	%	ha	%	ha	%	ha	%	ha	%	ha	%
Wheat	80	22.9	140	40.0	113	31.4	105	29.2	100	27.8	95	26.4
Barley	80	22.9	34	9.7	75	20.9	80	22.2	75	20.8	80	22.2
Maize	60	17.1	60	17.1	59	16.5	60	16.7	120	33.3	70	19.4
Rape	50	14.3	50	14.3	60	16.6	65	18.1	-	-	65	18.1
Sunflower	80	22.9	66	18.9	53	14.6	50	13.9	65	18.1	50	13.9
Total	350	100.0	350	100.0	360	100.0	360	100.0	360	100.0	360	100.0

Table 1. Structure of crops for the period 2008-2013, at SC Toma SRL

As prior plants, the rape was cultivated for all analyzed years after crops that clean the land, until the early August in order to ensure land preparation conditions and water storage needed to emergence. There was not cultivated after sunflower to prevent the spread of sclerotinia attack. The rape share of 14-18% allowed the rape to return to the same land until after a minimum of 4-5 years, and after sunflower after at least 3 years (Table 1). The crops of barley and wheat which ensured the prior plant within the farm for all years analyzed.

Plowing was done in late July, early August, immediately after cleaning the land to a depth of 20-25 cm in aggregate with star shape harrow. In the situation when the soil was dry and plowing could not perform without removing the boulders, it was imposed the soil processing with disc harrow in aggregate with adjustable harrows. The plow has been made after the first rain. Until sowing, the plowing remained clean of weeds and loose and shredded by works with disc harrow, in aggregate with adjustable harrow.

The rape is a plant consuming nutrients. In rape, the nutrient absorption occurs with intensity in the early stages of vegetation, but the greatest amount absorbed during the spring coming and early fruiting. In the company, the fertilizers managing before sowing was carried out with the dose of 200 kg / ha complex fertilizer in the range 18.46. After fertilizer managing, their incorporation was done with combinatorial at the depth of 10 cm.

The seeding was made during 1<sup>st</sup> -10<sup>th</sup> September, using a quantity of 8 kg / ha for varieties and 2.5-3.5 kg / in case of hybrids. The farm has grown at the beginning Valesca type, and the last 5 years hybrids Exagone (Monsanto), Mercure and Danone.

In 2012/2013, the hybrid Mecure was cultivated on 30 ha and hybrid Danube, on 35 ha, hybrids produced by Euralis (Table 2). Mercure ES hybrid is semi-late, one of the most cold tolerant hybrids and its potential production reaches 5900 kg / ha. DANUBE ES hybrid is semi-late, offering safe profit due to genetics and a high-performance hybrid is resistant to cold. The production potential of ES Danube is 5,300 kg / ha.[2]

Initially the company SC TOMA SRL sown winter rape at a distance of 25 cm between rows. Currently sowing is made at a distance of 37.5 cm between rows, this allows the use of smaller quantities of seed per hectare, better branching plant and therefore a significant production increase.

Crop/year	2008	2009	2010	2011	2012	2013
Rape	VALESCA	EXAGONE	MERCURE EXAGONE	EXAGONE	-	MERCURE, DANUBE

Table2. Rape varieties and hybrids grown by SC Tomas SRL, for the period 2007-2013

The seed is treated with an insecticide and fungicide, ORS Cruiser 322 FS (15 l / tonne of seed) against dirt flea (*Phyllotreta* SP), grey lice (*Brevycernie Brassicae*) rape wasp larvae generation G2, fall of seedlings, rizoctonioza, *Fusarium*, dry rot - infection from soil and seed. In recent years as a result of experience and testing done in the previous years, the company treats seeds with a natural stimulator for growth and development, product CROPMAX (1 litre / ton). [4] This bio stimulator has shown in practice that helps to develop the root system of the plant by 30%, it increases the plant resistance to cold rising its resistance level from -14 ° C to -19 ° C. This is due because the plant with a well developed root system stores its larger quantities of sugar, which increases resistance to frost. Also, in spring the vegetation restarting occurs with increased vigour against the plots witness and their seed was not treated with this product.

A not insignificant thing is that this is completely natural stimulator being made of three seaweed and it contains besides a wide range of trace elements, acids, essential amino acids for the plant. Sowing is done at 2-3 cm depth and it is necessary to roll the sowing, thus providing better contact between the seed (very small) and soil. This leads to a uniform and explosive emergence of the rape crop.

As the rape surfaces have become larger and larger, the maintenance works have increased and have become more and more expensive, because it started to appear aphid attacks, requiring treatment with a contact insecticide usually a synthesis stone. Because many times previous plant is wheat or barley, also in autumn it is required to fight against wheat and barley mixture as well as annual and perennial monocotyledonous species by their herbicide with a selective herbicide Pantera (11/ha). When spring is coming, the crop must be monitored very carefully because at temperatures above 10 ° C it can be attacked by strains ladybug (*Ceutorhynchus turnips*), the shiny rape bug (*Meligethes*) and rape wasp (*Athalia Rosa*). Detection of these pests attacks is done by installing yellow traps in the plant crop. When detecting such pests, immediately treatments will be made with contact and systemic insecticide (Faster10EC, 0.2 l / ha). The number of treatments varies depending on the night and daytime temperatures in spring and on the number of pest attacks.

Apart from the crop protection against these pests, a great importance must be paid to crop fertilization given the very high requirements of the plant nutrients which the plant consume during this period. Thus, one fertilisation was applied when starting the vegetation in March with 50 kg.Ns.a / ha, which besides nitrogen, it also contains boron, sulphur, manganese and other microelements necessary for rape crop. In the phase of flower button, one fertilization was also been carried out with 50 kgNsa / ha.

Before harvesting SC TOMA SRL used to prevent capsule dissolution on harvesting, a product called Nu-film which is a resin which incorporates the capsule preventing it to come apart and it allows capsule removal, and it allows water eliminating from the capsule not allowing its entry into grain. This treatment is done in the phase when the capsule colour changes from green to brown and the capsule still has elasticity. It applies in the air and it is given at a dose of 2-3 l / ha.

In order to purchase inputs, SC Toma SRL, provided the following companies: SC PRUTUL SA, SC AECTRA SA, BRISE GROUP, SC MIG VAS SA.

The harvesting was done using mechanized combine at 12-13% humidity. The international

trading rules of the rape are: maximum moisture 9%, maximum impurities 2%, minimum oil 40% (Pirnă I, 2011) [1].

Year	MU	2008	2009	2010	2011	2012	2013
Rape, SC Toma SRL	kg/ha	1800	2100	2800	2565		3300
	%	100.0	116.7	155.6	142.5		183.3
Rape at the country level*	kg/ha	1844	1357	1755	1882	1622	X
	Deviations from the (kg/ha)	-44	743	1045	683	X	X

Table 3. Evolution of average productions, at SC Toma SRL, for the period 2008-2013

\*\*\*MADR,2013,Agriculture, Rape for oil, <http://www.madr.ro/ro/culturi-de-camp/plante-tehnice/rapita-pentru-ulei.html> [4]

The average productions obtained by SC Toma SRL increased in the analyzed period. Thus from 1800kg/ha in 2008, it was a rape production of 3300 kg / ha in 2013 (Table 3). This was due to hybrids, observing the technology accurately, and the technological improvements with Bio stimulator CROMAX (1 litre / tonne of seed) in seed and plant treatment at maturity with Nu-film product (2-3l/ha) to prevent capsule dissolution. Compared to the national average productions, it is found that the farm was below the national average in 2008, but it has exceeded in 2008 (+743 kg/ha), 2009 (+1045 kg / ha), 2011 (+683 kg / ha).

The rape prices had a continuous increase over the past 6 years, from 1.1 euro / kg in 2008 to 1.65 lei/ kg in 2013 (an increase of 50%). In 2012, due to the fact that many units had destroyed productions, the rape price reached values between 1.8-2.34 lei/ kg. (Table 4). [3].

Year	MU	2008	2009	2010	2011	2012	2013
Rape	lei/kg	1.1	1.65	1.2	1.7	1.83*	1.65
	%	100.0	150.0	109.1	154.5		150.0

Table 4. Evolution of sale price, at SC Toma SRL, for the period 2008-2013

\*) Quotation MATIF for rape, harvest 2012, MADR[3].

In 2013, the company Toma, delivered the entire production harvested to the following beneficiaries: S.C PRUTUL S.A, S.C AECTRA S.A, BRISE GROUP, S.C MIG VAS S.A, at the price of 1,65 lei/kg.

Crop	Year	MU	2008	2009	2010	2011	2012	2013
Rape	Total production	to	90	105	168	167		215
		%	100.0	116.7	186.7	185.3		240.0
	Total income	Thousand lei	99	173	202	283		355
		%	100.0	175.0	203.6	286.3		360.0
	Income per hectare	lei/ha	1980	3465	3360	4360.5		5445
		%	100.0	175.0	169.7	220.2		275.0

Table 5. Evolution of the total production, total revenue and revenue per hectare at SC Toma SRL, for the period 2008-2013

The total production of rape increased in the analyzed period from 90 tons in 2008 to 215 tons in 2013 (240%) by increasing the productions per hectare and increasing the cultivated surfaces. (Table 5). Total revenue also increased from 99 thousand in 2008 to 355,000 lei in 2013 (360%), by increasing the total productions and the sale prices.

As main element of the technology is to increase the revenue per hectare which increased from 1980 lei / ha in 2008, to 5445 lei / ha in 2013, mainly due to the increase of average productions per hectare.

### CONCLUSIONS

1. Autumn rape crop has a real economic interest worldwide through its use in human nutrition and in industry .
2. The winter rape crop is an opportunity for SC TOMA SRL, Calarasi county , where it is cultivated on a reas between 50ha and 65 ha representing 14.3 % and 18.1 % of the farm surface.
3. Within the company, the technological links were followed: previous plant, prepared seedbed , sowing date , fertilization , pest control , harvesting .
4. Within the technology, Bio stimulator CROMAX intervened ( 1 litre / tonne of seed ) in seed and plant treatment at maturity with Nu film product ( 2-3l/ha ) to prevent capsule dissolution.
5. The harvests obtained and the sale prices of the rape allowed SC TOMA Srl , obtaining significant revenue, revenue per hectare increased from 1980 lei / ha in 2008 to 5445 lei / ha in 2013 (increase of 275 %).

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