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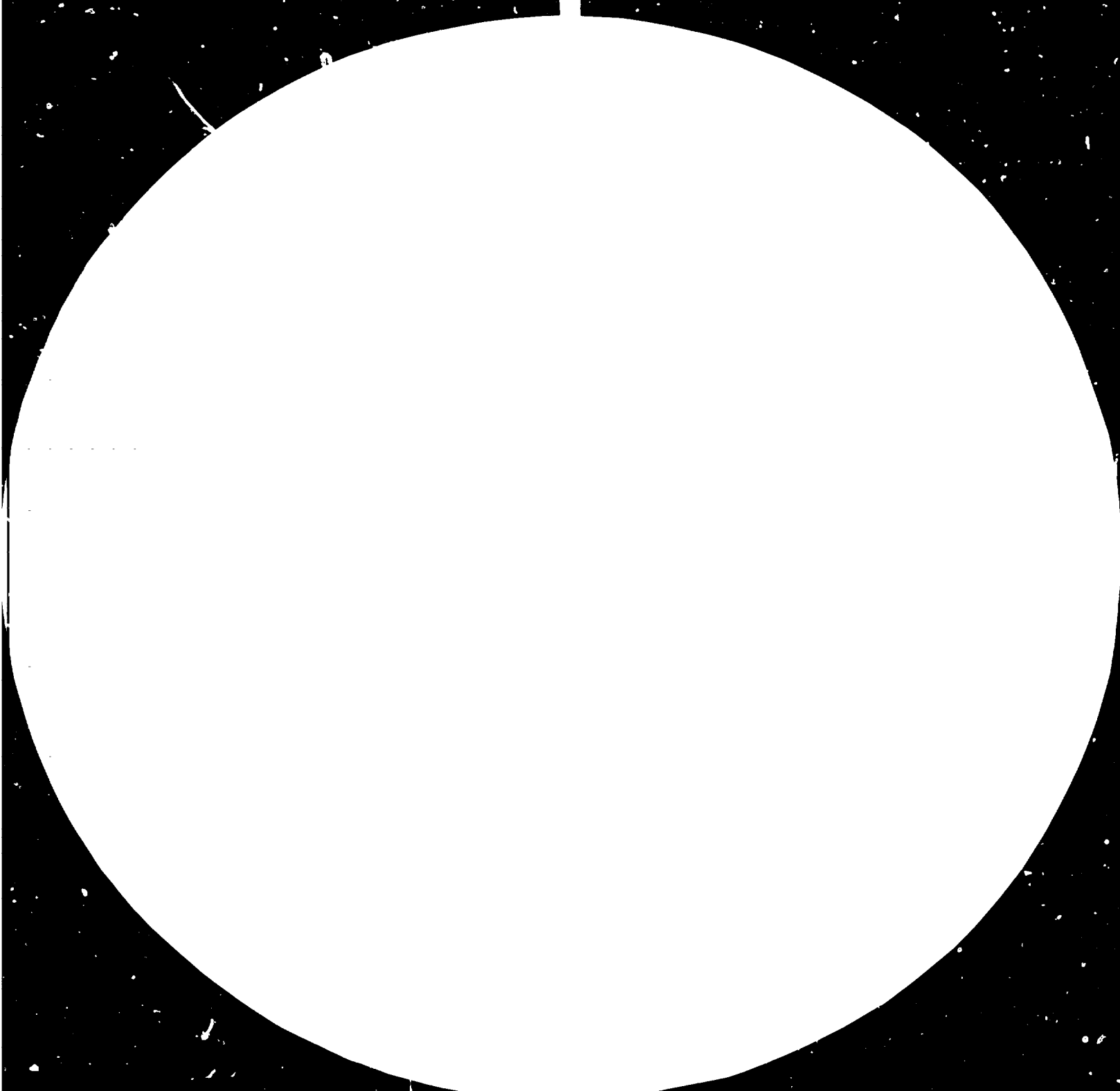


TABLE I  
 Comparison of the optical properties of the photopolymerized  
 and the thermally cured films

Sample	Photopolymerized		Thermally cured	
	Refractive index	Extinction coefficient	Refractive index	Extinction coefficient
1	1.50	0.00	1.50	0.00
2	1.50	0.00	1.50	0.00
3	1.50	0.00	1.50	0.00
4	1.50	0.00	1.50	0.00
5	1.50	0.00	1.50	0.00
6	1.50	0.00	1.50	0.00
7	1.50	0.00	1.50	0.00
8	1.50	0.00	1.50	0.00
9	1.50	0.00	1.50	0.00
10	1.50	0.00	1.50	0.00
11	1.50	0.00	1.50	0.00
12	1.50	0.00	1.50	0.00
13	1.50	0.00	1.50	0.00
14	1.50	0.00	1.50	0.00
15	1.50	0.00	1.50	0.00
16	1.50	0.00	1.50	0.00
17	1.50	0.00	1.50	0.00
18	1.50	0.00	1.50	0.00
19	1.50	0.00	1.50	0.00
20	1.50	0.00	1.50	0.00
21	1.50	0.00	1.50	0.00
22	1.50	0.00	1.50	0.00
23	1.50	0.00	1.50	0.00
24	1.50	0.00	1.50	0.00
25	1.50	0.00	1.50	0.00
26	1.50	0.00	1.50	0.00
27	1.50	0.00	1.50	0.00
28	1.50	0.00	1.50	0.00
29	1.50	0.00	1.50	0.00
30	1.50	0.00	1.50	0.00
31	1.50	0.00	1.50	0.00
32	1.50	0.00	1.50	0.00
33	1.50	0.00	1.50	0.00
34	1.50	0.00	1.50	0.00
35	1.50	0.00	1.50	0.00
36	1.50	0.00	1.50	0.00
37	1.50	0.00	1.50	0.00
38	1.50	0.00	1.50	0.00
39	1.50	0.00	1.50	0.00
40	1.50	0.00	1.50	0.00
41	1.50	0.00	1.50	0.00
42	1.50	0.00	1.50	0.00
43	1.50	0.00	1.50	0.00
44	1.50	0.00	1.50	0.00
45	1.50	0.00	1.50	0.00
46	1.50	0.00	1.50	0.00
47	1.50	0.00	1.50	0.00
48	1.50	0.00	1.50	0.00
49	1.50	0.00	1.50	0.00
50	1.50	0.00	1.50	0.00

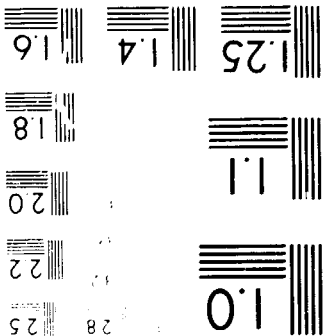


FIG. 1. Effect of photopolymerization on resolution.



10064



Distr.  
LIMITED  
ID/WG.330/2  
22 September 1980  
ENGLISH

United Nations Industrial Development Organization

Meeting on Exchange of Experiences and  
Co-operation among Developing Countries in the  
Development of Agricultural Machinery Industry  
Beijing, China, 20 - 27 October 1980

COUNTRY: YUGOSLAVIA  
EXPERIENCES GAINED IN LAUNCHING INDIGENOUS  
MANUFACTURE OF AGRICULTURAL MACHINERY\*

by

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Belgrade, September 1980

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## I. BACKGROUND INFORMATION

### 1. Introduction

Experiences gained in Launching Indigenous Manufacture of Agricultural Machinery are closely connected with the development of Yugoslav agriculture from 1945 upto today under three specific periods.

- The agriculture development under conditions of predominantly administrative direction in the period from 1945 up to 1955.

- The agriculture development from 1955 upto 1968 as the period of predominantly constitution and organization of production on basis of selfmanaging production relations when finally the Yugoslav agricultural policy have been drafted and implementation of new technology in agricultural production on industrial basis.

- The agriculture development after 1968, as the period characteristical for notable influence of Economic Reform, with all hesitations in realisation of fixed agricultural policy.

Evaluating the development of Agriculture for the past three decades, it could be concluded, that in this field of social work, in spite of hesitations and stagnations, marked results were achieved placing us, as per realised tempo of changes, in the leading group of countries in the world.

During those period the tractor and agricultural machinery industry in Yugoslavia became notable factor in development of Agriculture. Agriculture, as consumer of industrial products (partially of Metal and Chemical Industry) forms about 11% of total national products of the whole industry.

Type of crops and annual production

Year	(in thousand tons)					
	Wheat	Rye	Maize	Barley	Oat	Rice
1970	3.790	127	6.933	402	309	32
1974	6.282	120	6.031	794	353	31
1978	5.355	81	7.505	560	284	34
1979	4.599	81	10.084	651	283	34

The whole production of above commodities are utilized generally in Yugoslavia and at this stage export and import of those crops depending from the season.

The total area of Yugoslavia is 255.040 sq.km. Arable land is estimated at 9.917.000 ha. The proportion of arable land toward the total area of Yugoslavia makes 36%. The proportion of population, directly living is estimated to be about 35% of population, directly living from agricultural activities and nearly 25% of population lives indirectly from agricultural activities. In 1978 the total population of Yugoslavia marked 21.960.000 inhabitants.

Average size holdings in social and private sector

Size of holding Category	private		social	
	number	area ha	number	area ha
- 0.5 ha	298.602	142.340		
0.5 - 1.00 ha	250.014	323.96		
1.00 - 2.00 ha	464.604	1.078.089		
2.00 - 3.00 ha	339.991	1.371.670		
3.00 - 4.00 ha	287.072	1.338.768		
4.00 - 5.00 ha	239.260	1.224.985		
5.00 - 8.00 ha	384.131	2.516.240		
8.00 - 10.00 ha	129.223	1.010.939		
10.00 and over	146.497	650.262	2.879	4.242.738
	2.399.394	10.007.154	2.879	4.241.738

Agricultural areas in Yugoslavia

Category	(in thousand ha)		
	1970	1974	1979
Total	14.695	14.502	14.329
Social Sector	4.427	4.402	4.437
Individual ownership	10.268	10.100	9.892
1. Arable land	10.153	10.007	9.917
a) plough land and gardens	7.497	7.355	7.172
b) orchards	454	464	479
c) vineyards	254	247	246
d) meadows	1.948	1.941	2.020
2. Grass-land	4.473	4.415	4.324
3. Pools and reeds	69	60	69

2. Availability of agricultural machinery

Owing to the rapid and dynamic development of agriculture, the Yugoslav manufacturers have now developed into second largest producer in the metal manufacturing industry in Yugoslavia.

Types and quantity of locally manufactured equipment is given below:

		1976	1977	1978
Category I	tons	5.600	5.320	5.690
Category II	tons	7.800	8.200	8.600
Category III	tons	18.004	22.181	25.704
Category IV	tons	120.561	146.554	178.760
Total tons		151.965	182.255	218.834

Percentage of imported equipment represents 2 - 3% of total value of domestic production and export represents 12 - 15% of total value of domestic production.

Six tractor manufacturers deliver to users in Yugoslavia and abroad different models of tractors ranging from 18 - 300 hp. Five manufacturers of two-wheeled walking tractors and tillers offer 20 different models ranging from 2.8 to 15 hp. Selfpropelled grain combine harvesters presently produced in Yugoslavia have a feed rate of 3 to 8 kilograms per second. They are manufactured in four basic models powered by engines ranging from 65 to 165 hp. and they are equipped with attachments for harvesting maize, sunflower, rice, soyabeans, alfaalfa and other grain crops.

Properly oriented and well organised, the Yugoslav industry of tractor, agricultural machinery and equipment for mechanisation of agriculture, with its wide range of products, as outlined below, has represented a substantial basis for the development of modern farming technology both in large socially owned farms and in small privately owned farms.

3. Nations strategies or programme for the development of agricultural machinery industry

The tendency of food consumption changes as well as adjusting to limits for satisfaction of national requirements and potential export, under constant annual production growth rate of 4% for longer periods, but in consideration of notable change in structure of consumption are given below:



a) production    b) domestic consumption    c) potential export (a-b)

Articles		(in thousand tons)					
		Realized		Planned		Projection	
		1970-1975	%	1960	%	Projection	%
Grain	a	14.476	100	26.000	100	26.640	100
	b	14.356	99,2	26.000	100,0	20.667	75,3
	c	120	0,8	2.000	11,9	6.573	27,7
Tubercous plants	a	2.735	100	3.680	100	5.446	100
	b	1.420	51,9	1.446	89,3	1.576	28,8
	c	1.315	48,1	2.232	60,7	3.379	71,2
Sugar	a	534	100	1.309	100	1.936	100
	b	598	110,1	624	47,7	695	49,7
	c	45	-	665	52,3	1.242	50,3
Leguminous plants	a	191	100	212	100	314	100
	b	167	87,4	176	84	193	61,5
	c	24	12,6	34	16	121	38,5
Vegetable	a	2.126	100	3.206	100	4.746	100
	b	1.629	76,5	1.648	51,4	1.740	37,6
	c	449	23,5	1.560	48,6	2.964	62,4
Fruits	a	1.536	100	1.947	100	2.882	100
	b	1.066	69,2	1.092	56,1	1.616	41
	c	473	30,8	655	43,9	1.701	59,3
Meat	a	914	100	1.286	100	1.903	100
	b	888	97,1	846	65,8	916	48,1
	c	26	2,9	440	34,2	987	57,9
Milk	a	3.181	100	4.571	100	6.765	100
	b	1.696	53,4	1.693	37	1.335	27,1
	c	1.483	46,6	2.896	63	4.933	72,9
Fats	a	310	100	491	100	697	100
	b	366	124,5	379	77,2	410	58,8
	c	76	-	112	22,8	287	41,2

The national strategy for tractors, agricultural machinery and equipment in Yugoslavia rely on the development programme of Yugoslav agriculture, export facilities and co-operation abroad. It is very specific to indicate the facts that proportion of total industry of Yugoslavia in 1955 was 12% for primary raw materials and agricultural products and after 20 years later became 36%, indicating that Yugoslavia enter more and more into period in which we should consider agriculture as joint part of industrial system of food production.

The production volume of agricultural machinery may be judged to be in year 2000

a) tractors	60.000 nos/year
b) combines	4.000 nos/year
c) other agricultural machinery	180.000 tons/year
d) equipment	50.000 tons/year

Co-operation plan in production of agricultural machinery foresee further collaboration in tractor production between India, Egypt and Yugoslavia on basis of three-partite agreement. This cooperation may reach the value of 5% of total production. Co-operation consists of interdelivery of components, subassembly and assembly of tractors. Exchange of goods are regulated under Import Policy of each country. Standardisation of components have very important role in further development and exchange. Adaptation and redesign of imported equipment is always present and should be given full attention.

#### 4. Locally manufactured equipment

Domestic tractor and agricultural machinery production was estimated to be in 1979

a) Tractors	numbers	49.863
b) Agricultural machinery	tons	104.000
c) Other	tons	21.000

According to this information production has been supported  
by:

- (a) 80% by utilisation of domestic materials
- (b) 12% by utilisation of domestic materials more than 50% content
- (c) 8% by utilisation of domestic materials less than 50% content.

5. Types of equipment locally produced

As per estimate, 90% of locally produced equipment is manufactured according to domestic design and technology. (Refer to Appendix I.)

There are three licenses for wheel tractor production and six licenses for agricultural machinery production.

The proportion of those two categories is 90 : 10.

6. Present production

Present production of tractors and combine harvesters covers Yugoslav demand. There is shortage of supply in the market of agricultural machinery about 10,000 tons. Special agricultural machinery are more in demand which should be bridged by import and increase of the domestic production.

7. Demand for agricultural equipment

Growing mechanisation in agriculture requires newer technology and accordingly up to date machinery of larger capacities. This demand will exist permanently as result of development in agriculture, to increase yields and productivity.

To achieve this demand in agricultural machinery, the existence of the following is required:

- (a) Raw materials not produced in the country;
- (b) Foreign Exchange;
- (c) Skilled staff, maintenance staff, services
- (d) The facilities for design, redesign, production and marketing
- (e) Foreign co-operation within the country production programme of components production, subassembly and assembly.

regular measures which could solve above problems are incorporated in overall planning and production programmes of the Yugoslav Economy connected with realisation of export to developed and developing countries.

## II. EXPERIENCES

According to the experience of Yugoslav industry of tractors, agricultural machinery and equipment the following could be concluded:

(a) Domestic production of tractors, combine harvesters and agricultural machinery entered into extensive progress in design, technology of production and supply of spare parts. This progress facilitates further development of new design of higher capacities.

(b) Co-operation in tractor and specific agricultural machinery production with foreign partners are giving satisfactory results but availability of financial resources and payment of imports are very complicated and very often expensive.

In connection with this one could say that difficulties may be following:

(a) In domestic production further development of modern technology up to date design and increase of machine capacity represents main difficulties. Changes are supposed to be introduced in organisation and management as primary factors for better production results and product price. Marketing becomes most important factor in sales and production plan.

(b) Production in co-operation with other countries have achieved marked level with India, Egypt and Algeria. Very good prospects exist to develop co-operation with other developing countries.

III. RECOMMENDATIONS

Co-operation facilities exist with developing countries and developed countries. We assume that standardisation of components of tractors and agricultural machinery within the system UNIDO between developing and developed countries may create overall increase in production. Exchange of components, technologies, organisations and services will ensure proper functioning of all machinery.

Appendix I

AGRICULTURAL MACHINES AND IMPLEMENTS

Category	Manufacturer name	Type model	Engine Power kw	Remarks
1	2	3	4	5
1.2.1	"IMT" - Knjževac	IMT-518	14	locally produced
2KN	"Store" - Store	Store-302	20	tech. cooperation
	"T.Vinkovic"-Bjelovar	TV-418	11	locally produced
	"T.Vinkovic"-Bjelovar	TV-521	13	locally produced
	"T.Vinkovic"-Bjelovar	TV-730	20	locally produced
	"T.Vinkovic"-Bjelovar	TV-730S	20	locally produced
	"T.Vinkovic"-Bjelovar	TV-640	25	locally produced
1.2.2	"T.Vinkovic"-Bjelovar	TV-840 P	25	locally produced
6KN	"T.Vinkovic"-Bjelovar	TV-955	36	locally produced
	"Store" - Store	Store-402	30	tech. cooperation
	IMT - Beograd	IMT-533	25	locally produced
	IMT - Beograd	IMT-539	30	locally produced
	IMT - Beograd	IMT-540	32	locally produced
	"IMT" - Beograd	IMT-542	32	locally produced
	"IMT" - Beograd	IMT-546	35	locally produced
	"IMT" - Beograd	IMT-547	35	locally produced
	"IMT" - Beograd	IMT-558	42	locally produced
1.2.	"IMT" - Beograd	IMT-559	42	locally produced
	"IMT" - Beograd	IMT-560	42	locally produced
9KN	"IMR" - Rakovica	R-60	42	locally produced
	"IMR" - Rakovica	R-60 Super	42	locally produced
	"IMR" - Rakovica	R-65	48	locally produced
	"Torpedo" - Rijeka	D-4006	29	tech. cooperation
	"Torpedo" - Rijeka	D-4506	33	tech. cooperation
	"Torpedo" - Rijeka	D-4506V0	33	tech. cooperation
	"Bratstvo" - Pucarevo	BNT-F-455 co	35	locally produced
	"Bratstvo" - Pucarevo	BNT-F-455 cm	35	locally produced
	"Torpedo" - Rijeka	TD-7506 H	55	tech. cooperation
1.2.4	"Torpedo" - Rijeka	TD-7506	55	tech. cooperation
14KN	"Torpedo" - Rijeka	TD-7506A	55	tech. cooperation
	"Torpedo" - Rijeka	TD-7506V	55	tech. cooperation
	"IMR" - Rakovica	R-90	76	locally produced
	"Store" - Store	Store-902	64	tech. cooperation
	"Store" - Store	Store-904	64	tech. cooperation

1	2	3	4	5
1.2.4.	"INT" - Beograd	INT-577 lux	54	locally produced
	"INT" - Beograd	INT-577 DV	54	locally produced
15KN	"INT" - Beograd	INT-578	54	locally produced
	"INT" - Beograd	INT-576 lux	54	locally produced
	"INT" - Beograd	INT-579	54	locally produced
	"INT" - Beograd	INT-579 lux	54	locally produced
	"INT" - Beograd	INT-590 DV	66	locally produced
	"INT" - Beograd	INT-5100	82	locally produced
	"INT" - Beograd	INT-5130	100	locally produced
	"INT" - Beograd	INT-5136	100	locally produced
1.2.5.	"IMR" - Rakovica	R-120	87	locally produced
	"Torpedo" - Rijeka	DX-110	78	tech. cooperation
20KN	"Torpedo" - Rijeka	DX-110A	78	tech. cooperation
	"Pobeda" - Novi Sad	Steyer 8120	74	tech cooperation
	"Pobeda" - Novi Sad	Steyer 8120A	74	tech. cooperation
	"Pobeda" - Novi Sad	Steyer 8140	100	tech. cooperation
	"Pobeda" - Novi Sad	Steyer 8140A	100	tech. cooperation
	"Bratstvo" Pucarevo	BNT-P-605c	50	locally produced
	"Bratstvo" - Pucarevo	BNT-JD-4440	114	tech. cooperation
1.2.6.	"Bratstvo" - Pucarevo	BNT-JD-4640	131	tech. cooperation
30KN	"Pobeda" - Novi Sad	Steyer 8160A	118	tech. cooperation
	"Torpedo" - Rijeka	Dx-160A	110	tech. cooperation
1.2.7.	"Bratstvo" - Pucarevo	BNT-75	51	locally produced
40KN	"Bratstvo" - Pucarevo	BNT-90	66	locally produced
	"Bratstvo" - Pucarevo	BNT-105	77	locally produced
1.2.8.	"INT" - Beograd	INT-5200	152	locally produced
	"INT" - Beograd	INT-5270	180	locally produced
50KN	"Bratstvo" - Pucarevo	BNT-JD-8440	160	tech. cooperation
	"Bratstvo" - Pucarevo	BNT-150	110	locally produced
	"Bratstvo" - Pucarevo	BNT-120c	88	locally produced
1.2.9	"Bratstvo" - Pucarevo	BNT-130	118	locally produced
60KN	"INT" - Beograd	INT-5360	257	locally produced
1.2.10	"Bratstvo" - Pucarevo	BNT-TDT-55A	61	locally produced
80KN				
1.2.11	"INT" - Beograd	INT-5500	368	locally produced
100KN				

IMPLEMENTS AND MACHINES FOR SOIL TILLAGE

1	2	3	4	5
3.1.1.	INT - Beograd			locally produced
	OLT - Osijek			locally produced
	LEMIND - Leskovac			locally produced
	ENT-Bos. Dubica			locally produced
3.1.2.	OLT - Osijek	disc ploughs		locally produced
3.1.3.	ENT - Pucarevo	rippers		locally produced
3.1.4.	INT - Beograd	Rotavator		locally produced
3.1.5.	OLT - Osijek	Special		locally produced
	LEMIND - Leskovac	ploughs		
3.2.	<u>IMPLEMENTS AND MACHINES FOR ADDITIONAL SOIL TILLAGE</u>			
3.2.1.	INT - Beograd	Disc harrows		locally produced
	OLT - Osijek	Disc harrows		locally produced
	BNT - Bos. Dubica	Disc harrows		locally produced
	LEMIND - Leskovac	Disc harrows		locally produced
3.2.2.	INT - Beograd	Cultivators		locally produced
	OLT - Osijek	Cultivators		locally produced
	LEMIND - Leskovac	Cultivators		locally produced
3.2.3.	INT - Beograd	Spike tooth harrows		locally produced
	OLT - Osijek	Spike tooth harrows		locally produced
	BNT - Bos. Dubica	Spike tooth harrows		locally produced
	LEMIND - Leskovac	Spike tooth harrows		locally produced
3.2.4.	OLT - Osijek	Combine rollers		locally produced
3.3.	<u>IMPLEMENTS AND MACHINES FOR THE PRESOWING BED PREPARATION</u>			
3.3.1.	INT - Beograd	Presowing bed preparation		locally produced
	OLT - Osijek	Presowing bed - preparation		locally produced
3.4.	<u>SPECIAL COMBINED MACHINES</u>			
3.4.1.	INT - Beograd	Special machines 1 operation		locally produced
	OLT - Osijek	Special machines 3 operation		locally produced
3.4.2.	INT - Beograd	Special machines 6 operation		locally produced
	OLT - Osijek	Special machines 6 operation		locally produced



1	2	3	4
4.	<u>MACHINES AND EQUIPMENT FOR SOIL FERTILIZING</u>		
4.1.	<u>MACHINES FOR SURFACE FERTILIZED DISTRIBUTION</u>		
4.1.1.	ZNAJ - Zemun	Zmaj 471	locally produced
	SIP - SENPETER	KRAAN 30 V	locally produced
4.1.2	IMT - Beograd	IMT-625	locally produced
	POBEDA-ODZACI	Spreader	locally produced
4.1.3	POBEDA - Odzaci	Spreader	locally produced
4.1.4	CREINA - Kranj	Tankers	locally produced
	MAJEVICA - B. Palanka	Tankers	locally produced
4.1.5	CREINA - Kranj	Slurry distribution	locally produced
4.2.	<u>MACHINES FOR FERTILIZER INPUT</u>		
4.2.1.	CREINA - Kranj	Fluid fertilizer	locally produced
	MAJEVICA - B. Palanka	Fluid fertilizer	locally produced
	CREINA - Kranj	Amonia applicator	locally produced
	MAJEVICA - B. Palanka	Amonia applicator	locally produced
4.2.2.	IMT - Beograd	Adapters	locally produced
	OLT - Osijek	Adapters	locally produced
4.2.3.	IMT - Beograd	Adapters	locally produced
	OLT - Osijek	Adapters	locally produced
4.3.	<u>EQUIPMENT FOR PREPARATION AND MANIPULATION OF FERTILIZER</u>		
4.3.1.	CREINA - Kranj	Crushers	locally produced
4.3.2.	CREINA - Kranj	Mixers	locally produced
4.3.3.	CREINA - Kranj	Pumps	locally produced
4.3.4.	CREINA - Kranj	Tankers	locally produced
	MAJEVICA-B. Palanka	Tankers	locally produced
5.	<u>SOWING AND PLANTING MACHINES</u>		
5.1.	<u>SOLID PLANTING MACHINES</u>		
5.1.2.	IMT - Beograd	Drills	locally produced
	OLT - Osijek	Drills	locally produced
5.1.3.	IMT - Beograd	Grass drills	locally produced
	OLT - Osijek	Grass drills	locally produced
5.2.	<u>ROW CROP PLANTING MACHINES</u>		
5.2.1.	IMT - Beograd	Maize planter	locally produced
	OLT - Osijek	Maize planter	locally produced
5.2.2.	IMT - Beograd	Sugar beet planter	locally produced
	OLT - Osijek	Sugar beet planter	locally produced

1	2	3	4	5
5.2.3.	OLT - Osijek	Multi planter		locally produced
	IKT - Beograd	Multi planter		locally produced
5.2.4.	OLT - Osijek	Vegetable seed planter		locally produced
	TTS-Bos.Kostajnica	Vegetable seed planter		locally produced
5.2.5.	OLT - Osijek	Other planters		locally produced
5.3.	<u>TRANSPLANTING MACHINES</u>			
5.3.1.	TPS - Bos.Kostajnica	Potato planter		locally produced
5.3.2.	TRS - Bos.Kostajnica	Self seeder potato planter		locally produced
5.3.3.	TPS - Bos.Kostajnica	Transplanting machine		locally produced
5.3.4.	TPS - Bos.Kostajnica	Rice planter		locally produced
5.3.5.	TPS - Bos.Kostajnica	Onion planter		locally produced
6.	<u>IMPLEMENTS AND MACHINES FOR ROW CULTIVATION AND WEEDS REMOVAL</u>			
6.1.	<u>INTER ROW CULTIVATOR</u>			
6.1.1.	IHT - Beograd	Cultivator		locally produced
	OLT - Osijek	Cultivator		locally produced
6.1.2.	IHT - Beograd	Rotavator		locally produced
	MIO - Osijek	Rotavator		locally produced
6.1.3.	MIO - Osijek	Scarificator		locally produced
6.1.4.	MIO - Osijek	Needle rollers		locally produced
7.	<u>EQUIPMENT AND MACHINES FOR IRRIGATION</u>			
7.1.	<u>RAIN SPRINKLER EQUIPMENT</u>			
7.1.1.	AGROSTROJ-Ljubljana METALNA STIP	Sprinkler, short distance target		locally produced
7.1.2.	AGROSTROJ-Ljubljana METALNA STIP	Sprinkler, medium and far distance target		locally produced
7.1.3.	AGROSTROJ-Ljubljana METALNA STIP	Stationary sprinkler system		locally produced
7.1.4.	AGROSTROJ-Ljubljana METALNA STIP	Drop by Drop system		locally produced
7.1.5.	AGROSTROJ-Ljubljana METALNA STIP	Freezing protection system		locally produced
7.2.	<u>MACHINES FOR ARTIFICIAL RAIN</u>			
7.2.1.	AGROSTROJ-Ljubljana METALNA STIP	Tractor Mounted and Drawn		locally produced
7.2.2.	AGROSTROJ-Ljubljana METALNA STIP	Transportable wings		locally produced
7.2.3.	AGROSTROJ-Ljubljana METALNA STIP	Selfpropelled boom sprinkler for low plants		locally produced
7.2.4.	AGROSTROJ-Ljubljana METALNA STIP	Selfpropelled boom sprinkler for high plants		locally produced

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7.3.	<u>PUMPINO SETS</u>			
7.3.1.	AGROSTROJ-Ljubljana	Tractor mounted		locally produced
7.3.2.	AGROSTROJ-Ljubljana	Tractor drawn		locally produced
7.3.3.	AGROSTROJ-Ljubljana	Floating pumping set		locally produced
7.3.4.	AGROSTROJ-Ljubljana	Stationary pumping set		locally produced
7.4.	<u>ARMATURE FOR IRRIGATION</u>			
7.4.1.	AGROSTROJ-Ljubljana METALNA STIP	Joint pipe		locally produced
7.4.2.	AGROSTROJ-Ljubljana METALNA STIP	Sprinklers		locally produced
7.4.3.	AGROSTROJ-Ljubljana	Vacuum injector		locally produced
8.	<u>PLANT PROTECTION MACHINES</u>			
8.1.	<u>SPRAYING MACHINES</u>			
8.1.1.	MORAVA-Pozarevac	Hydraulic sprayers		locally produced
	PANONIJA-Sobota	Hydraulic sprayers		locally produced
8.1.2.	MORAVA-Pozarevac	Hydro-pneumatic sprayers		locally produced
	PANONIJA-Sobota	Hydro-pneumatic sprayers		locally produced
8.1.3.	MORAVA-Pozarevac	Atomizer		locally produced
8.1.4.	MORAVA-Pozarevac	Aerosol		locally produced
8.1.5.	MORAVA-Pozarevac	Adapters for drills and cultivators		locally produced
8.2.	<u>DUSTING MACHINES</u>			
8.2.1.	MORAVA-Pozarevac	Ventilator duster		locally produced
8.2.2.	MORAVA-Pozarevac	Electric duster		imported
8.2.3.	MORAVA-Pozarevac	Adapters		locally produced
8.3.	<u>SEED DESINFECTON MACHINES</u>			
8.3.1.	MORAVA-Pozarevac	Dry desinfection		cooperation
8.3.2.	MORAVA-Pozarevac	Wet desinfection		cooperation
8.3.3.	MORAVA-Pozarevac	Gas desinfection		cooperation
8.3.4.	MORAVA-Pozarevac	Electric desinfection		cooperation
8.4.	<u>STERILIZATION MACHINES</u>			
8.4.1.	MORAVA-Pozarevac	Fumigators		cooperation
8.5.	<u>MACHINES AND EQUIPMENT FOR PREPARATION AND MANIPULATION OF PROTECTON AGENCE</u>			
8.5.1.	MORAVA-Pozarevac	Preparation emulsion		cooperation
8.5.2.	MORAVA-Pozarevac	Manipulation machine		cooperation

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9.	<u>HAY HARVESTING AND HANDLING MACHINES</u>				
9.1.	<u>GRASS MOWER</u>				
9.1.1.	SIP SENPETER		Drawn Swing		locally produced
9.1.2.	SIP SENPETER		Tractor mounted		locally produced cooperation
9.1.3.	ZMAJ-Zemun		Selfpropelled floating		cooperation
9.2.	<u>CROSHER</u>				
9.2.1.					
9.2.2.					
9.3.	<u>RAKE - TURNER - SHAKER</u>				
9.3.1.	SIP SENPETER		Rake-transversal		locally produced
9.3.2.	SIP SENPETER		Rake-side		locally produced
9.3.3.	SIP SENPETER		Hay turner		locally produced
9.3.4.	SIP SENPETER		Hay shaker		locally produced
9.3.5.	SIP SENPETER		Hay gathering turner		locally produced
9.4.	<u>PICK-UP PRESS</u>				
9.4.1.	POLJOSTROJ		Piston press		cooperation
9.4.2.			Roto-press		
9.4.3.	ZMAJ-ZEMUN		Stock head		cooperation
9.5.	<u>HAY LOADER</u>				
9.5.1.					
9.5.2.	SIP SENPETER		Prop up loader		locally produced
9.5.3.	SIP SENPETER		Balle loader		locally produced
9.5.4.	SIP SENPETER		Selfpropelled stock conveyor		locally produced
10.	<u>FORAGE CHOPPING AND HANDLING</u>				
10.1.	<u>FORAGE COMBINE-TRACTOR</u>				
10.1.1.	SIP SENPETER		Combine tearup		tech. cooperation
	POBEDA - Novi Sad		Combine tearup		tech. cooperation
10.1.2.	ZMAJ-Zemun		Forage combine		tech. cooperation
10.1.3.	ZMAJ-Zemun		Forage combine high stock drawn		tech cooperation
10.1.4.	ZMAJ-Zemun		Forage combine high stock hanging		tech. cooperation
10.2.	<u>SELFPROPELLED FORAGE COMBINE</u>				
10.2.1.	ZMAJ-Zemun		Forage combine		tech. cooperation

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11.	<u>GRAIN, LEGUMINOSAE OILSEED HARVESTING MACHINES</u>			
11.1.	<u>MULTI PHASE SYSTEM MACHINES</u>			
11.2.1.	ZMAJ-Zemun	Selfpropelled combine 3 kg/sec		locally produced
11.2.2.	ZMAJ-Zemun	Selfpropelled combine 4-6 kg/sec		locally produced
11.2.3.	ZMAJ-Zemun	Selfpropelled combine 7-9 kg/sec		locally produced
11.2.4.	ZMAJ-Zemun	Selfpropelled combine 10-12 kg/sec		locally produced
11.2.5.	ZMAJ-Zemun	Selfpropelled combine for hills		locally produced
11.2.6.	ZMAJ-Zemun	Selfpropelled combine for rice		locally produced
11.3.	<u>ADAPTERS FOR GRAIN COMBINES</u>			
11.3.1.	ZMAJ-Zemun	Adapter pickup		locally produced
11.3.2.	ZMAJ-Zemun	Adapter sunflower		locally produced
11.3.3.	ZMAJ-Zemun	Adapter soya beans		locally produced
11.3.4.	ZMAJ-Zemun	Adapter rice		locally produced
11.3.5.	ZMAJ-Zemun	Adapter leguminosae		locally produced
11.3.6.		Adapter hops millet		locally produced
11.3.7.	ZMAJ-Zemun	Adapter grass seeds		locally produced
11.3.9.	ZMAJ-Zemun	Straw press		locally produced
11.3.10.	ZMAJ-Zemun	Header trailer		locally produced
12.	<u>CORN PICKING SHELLING</u>			
12.1.	<u>CORN PICKER</u>			
12.1.1.	ZMAJ-Beograd	one row picker		locally produced
12.1.2.	SIP-Senpeter			
12.1.2.	ZMAJ-Beograd	two row picker shelling		locally produced
12.1.3.	ZMAJ-Beograd	two row picker husker		locally produced
12.1.4.	ZMAJ-Beograd	pickers for gathering		locally produced
12.1.5.	ZMAJ-Beograd	selfpropelled corn combine		locally produced
12.1.6.	ZMAJ-Beograd	adapter for corn		locally produced
12.1.7.	ZMAJ-Beograd	adapter for corn crushing		locally produced
12.2.	<u>CORN DRESSING MACHINES</u>			
12.2.1.	SIP-SENPIETER	Stationary shellers		locally produced
12.2.2.	SIP-SENPIETER	Stationary huskers		locally produced
12.2.3.	ZMAJ-ZEMUN POBEDA - Novi Sad	Cornstalk cutter		locally produced

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13.	<u>POTATO HARVESTING DRESSING MACHINES</u>			
13.1.	<u>POTATO HARVESTING MACHINES</u>			
13.1.1.		Potato stalk chopper		
13.1.2.	IRT-Beograd HAJEVICA-B.Palanka	Potato digger		locally produced
13.1.3.		Potato digger in rows		
13.1.4.		Potato digger with selection table		
13.1.5.		Potato combine drawn		
13.1.6.		Selfpropelled potato combine		
13.2.	<u>POTATO DRESSING MACHINE</u>			
13.2.1.		Stone removal machines		
13.2.2.		Potato grading machines		
13.2.3.		Washing grading		
14.	<u>BEET HARVESTING DRESSING MACHINES</u>			
14.1.	<u>SUGARBEET HARVESTING MACHINES</u>			
14.1.1.	LIPAN-St.Pazova HAJEVICA-B.Topola	Combine drawn		locally produced
14.1.2.	LIPAN-St.Pazova HAJEVICA-B.Topola	Selfpropelled combine		locally produced
14.1.3.	LIPAN-St.Pazova HAJEVICA-B.Topola	Header leaf cutter, drawn		locally produced
14.1.4.	LIPAN-St.Pazova HAJEVICA-B.Topola	Header leaf cutter, selfpropelled		locally produced
14.1.5.	LIPAN-St.Pazova HAJEVICA-B.Topola	Beet digger, drawn		locally produced
14.1.6.	LIPAN-St. Pazova HAJEVICA-B.Topola	Beet digger, self- propelled		locally produced
14.1.7.		Potato digger cum header, drawn		locally produced
14.1.8.		Potato header from rows		
14.2.	<u>CARROT HARVESTING MACHINES</u>			
14.2.1.		Carrot harvesting machine drawn		
14.2.2.		Carrot harvesting machine, mounted		
14.3.	<u>BEET DRESSING MACHINES</u>			
14.3.1.	LIPAN-St.Pazova HAJEVICA-B.Topola	Beet loader, drawn		locally produced
14.3.2.		Selfpropelled beet loader		
14.3.3.	LIPAN-St.Pazova HAJEVICA-B. Palanka	Chopper of top leaves		locally produced

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15. VEGETABLE HARVESTING DRESSING MACHINES

15.1. VEGETABLE HARVESTING MACHINES

- 15.1.1. Tomato combine, drawn
- 15.1.2. Selfpropelled tomato combine
- 15.1.3. Cabbage picker
- 15.1.4. Green salad picker
- 15.1.5. Carrot, radish, beet picker
- 15.1.6. Spinach picker
- 15.1.7. Onion picker
- 15.1.8. Cucumber picker
- 15.1.9. Green peas combine

15.2. SEED THRESHING AND SELECTING MACHINES

- 15.2.1. Green peas thresher
- 15.2.2. Selecting seed machines

16. FIBRE PLANT HARVESTING MACHINES

16.1. FLAX HARVESTING MACHINES

- 16.1.1. Flax plucking
- 16.1.2. Flax stalk gathering machine
- 16.1.3. Flax gathering threshing
- 16.1.4. Stationary flax thresher
- 16.1.5. Flax combine

16.2. HEMP HARVESTING MACHINES

- 16.2.1. Hemp selfbinding machine
- 16.2.2. Hemp thresher
- 16.2.3. Hemp combine
- 16.2.4. Hemp baler

16.3. CANABIS HARVESTING MACHINES

- 16.3.2. Cannabis picker
- 16.3.2. Cannabis thresher

16.4. COTTON HARVESTING MACHINES

- 16.4.1. Cotton picker
- 16.4.2. Cotton picker mounted
- 16.4.3. Selfpropelled cotton picker
- 16.4.4. Cotton fibre gathering machines

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17.	<u>HOPS HARVESTING DRESSING MACHINES AND EQUIPMENT</u>			
17.1	<u>HOPS HARVESTING MACHINES</u>			
17.1.1.		Hopsloading machines		
17.1.2.		Stationary hops picker		
17.1.3.		Line plant for hops picker		
17.2.	<u>HOPS DRESSING MACHINES</u>			
17.2.1.		Platform for dressing		
17.2.2.		Packing press		
18.	<u>TOBACCO HARVESTING DRESSING MACHINES</u>			
18.1.	<u>TOBACCO PLUCKING MACHINES AND EQUIPMENT</u>			
18.1.1.		Tobacco topper		
18.1.2.		Tobacco plucker		
18.1.3.		Platform for tobacco leaf plucking		
18.2.	<u>TOBACCO DRESSING MACHINES AND EQUIPMENT</u>			
18.2.1		Tobacco leaf stringing machine		
18.2.2.		Tobacco bailer		
18.2.3.		Tobacco fermentation plant		
19.	<u>SPECIAL MACHINES AND EQUIPMENT IN WINE-GROWING</u>			
19.1.	<u>WINE CROWING MACHINES</u>			
19.1.1.		Pillar hole digger machine		
19.1.2.		Pillar stamp drawn machine		
19.1.3.		Stretching and forcing wire machine		
19.1.4		Wine planting machine		
19.1.5.		Frame wine loping machine		
19.1.6		Grape harvesting combine		
19.2.	<u>WINE GROWING EQUIPMENT</u>			
19.2.1.	IPS-Bos.Kostajnica	Wine press		
19.2.2.		Wine preparation equipment		
19.2.3.		Wine electrostatic filter		
19.2.4		Wine growing hand tools		



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20.	<u>SPECIAL MACHINES AND EQUIPMENT IN FRUIT-GROWING</u>			
20.1.	<u>FRUIT-GROWING MACHINES</u>			
20.1.1.	TOMOS-Koper	Plant hole digger		locally produced
20.1.2.		Planting machine		
20.1.3.		Frame loading machine		
20.1.4.		Fruit vibro shaker machine		
20.2.	<u>FRUIT-GROWING MACHINES</u>			
20.2.1.		Hand plucking fruit platform		
20.2.2.		Hand tools-		
21.	<u>AGRICULTURAL TRANSPORTATION MEANS</u>			
21.1.	<u>TRANSPORTATION MEANS OF GENERAL USE</u>			
21.1.1.	IMT-Beograd TREPČA-KOS.Mitrovica	Universal tractor trailers single axle		locally produced
21.1.2.	ZMAJ-Zemun	Universal tractor trailers double axle		locally produced
21.1.3.	ZMAJ-Zemun	Tractor container trailers		locally produced
21.1.4.	ZMAJ-Zemun	Tractor trailers for high unloading		locally produced
21.1.5.	ZMAJ-Zemun	Vehicle trailers		locally produced
21.2.	<u>TRANSPORTATION MEANS OF SPECIFIC USE</u>			
21.2.1.	ZMAJ-Zemun TEHNOSTROJ-Ljutomer	Loose charge spreader		locally produced
21.2.2.	SIP SENPETER	Selfloading-unloading forage trailers		locally produced
21.2.3.	SIP SENPETER	Selfunloading forage trailers		locally produced
21.2.4.	ZMAJ-Zemun TEHNOSTROJ-Ljutomer	Bulky material trailers		locally produced
21.2.5.	IMEZAD-Zalec	Topn trailer		locally produced
21.2.6.	CREINA-Kranj MAJEVICA-B.Palanka	Tanker trailer		locally produced
21.2.7.	TPS-Belje	Specific trailer mixers		locally produced
21.2.8.	IMT - Beograd	Tractor transportation boxes		locally produced
21.2.9.	AGROSTROJ-Ljubljana	Irrigation pipes trailer		locally produced
21.2.10.	OLET-Osijek	Bed preparation machine trailers		locally produced

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22.	<u>TRAIL BLUWARD MACHINE EQUIPMENT</u>			
22.1.	<u>ELEVATORS-CONVEYORS</u>			
22.1.1.	ZMAJ-Zemun	Chain elevator	locally produced	
22.1.2.	ZMAJ-Zemun	Band elevator	locally produced	
22.1.3.	ZMAJ-Zemun	Spiral elevator	locally produced	
22.1.4.	POESDA - Novi Sad	Blowers	locally produced	
22.1.5.	POBELA - Novi Sad	Grain Blower	locally produced	
22.2.	<u>LOADERS-HISTS</u>			
22.2.1.	INT-Beograd SIP-SERPETER	Front tractor loader		
22.2.2.	INT-Beograd SIP-SERPETER	Rear tractor loader		
22.2.3.		Hoists mounted on vehicle		
23.	<u>IMPLEMENTS MACHINES FOR SINGLE AXEL TRACTORS-POWER TILLERS</u>			
23.1.	<u>IMPLEMENTS MACHINES FOR SOIL TILLAGE</u>			
23.1.1.	INT-Knjazevac MIO STANDARD-Osijek	Ploughs	locally produced	
23.1.2.	INT-Knjazevac MIO STANDARD-Osijek	Rotvators	locally produced	
23.1.3.	INT-Knjazevac MIO STANDARD-Osijek	Spike-tooth harrows	locally produced	
23.1.4.	INT-Knjazevac MIO STANDARD-Osijek	Cultivator	locally produced	
23.1.5.	INT-Knjazevac MIO STANDARD-Osijek	Combined implements	locally produced	
23.2.	<u>PLANT PROTECTION MACHINE IRRIGATION</u>			
23.2.1.	INT-Knjazevac MIO STANDARD-Osijek	Spraying pump	locally produced	
23.2.2.	INT-Knjazevac MIO STANDARD-Osijek	Sprayers with tanker	locally produced	
23.2.3.	INT-Knjazevac MIO STANDARD-Osijek	Irrigation pumps	locally produced	
23.3.	<u>HAY MOWERS DRESSING MACHINES</u>			
23.3.1.	INT-Knjazevac MIO STANDARD-Osijek	Side mower	locally produced	
23.3.2.	INT-Knjazevac MIO STANDARD-Osijek	Front mower	locally produced	
23.3.3.	INT-Knjazevac MIO STANDARD-Osijek	Roto mower	locally produced	
23.3.4.	INT-Knjazevac MIO STANDARD-Osijek	Rakes	locally produced	
23.3.5.	INT-Knjazevac MIO STANDARD-Osijek	Hay turners	locally produced	

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23.4.	<u>OTHER EQUIPMENT</u>			
23.4.1.	INT-Knjazevac MIO-Osijek	Winch with wirerope		locally produced
23.4.2.	INT-Knjazevac MIO-Osijek	Pulley		locally produced
23.4.3.	INT-Knjazevac MIO-Osijek	Cleaning brushes		locally produced
23.4.4.	INT-Knjazevac MIO-Osijek	Snow cleaner		locally produced
23.4.5.	INT-Knjazevac MIO-Osijek	Potato digger		locally produced
24.	<u>TRACTOR ENGINES AND AGRICULTURAL MACHINES</u>			
24.1.	<u>SMALL CAPACITY ENGINES - "GOTO"</u>			
24.1.1.	INT-Knjazevac DMB	Small capacity engines to 2 kw		locally produced
24.1.2.	INT-Knjazevac DMB	Small capacity engines 2 - 4 kw		locally produced
24.1.3.	INT-Knjazevac DMB	Small capacity engines 4 - 6 kw		locally produced
24.1.4.	INT-Knjazevac DMB	Small capacity engines 6 - 8 kw		locally produced
24.2.	<u>SMALL CAPACITY ENGINE - DIESEL</u>			
24.2.1.	DMB-Rakovica	Small capacity engines 4 - 6 kw		locally produced
24.2.2.	DMB-Rakovica	Small capacity engines 6 - 8 kw		locally produced
24.2.3.	DMB-Rakovica	Small capacity engines 8 - 10 kw		locally produced
24.2.4.	DMB-Rakovica	Small capacity engines 10 - 20 kw		locally produced
24.3.	<u>ENGINES - DIESEL (OVER 20 KW)</u>			
24.3.1.	INT-Rakovica TORPEDO-Rijeka	Diesel engines 21 - 25 kw		locally produced
24.3.2.	INT-Rakovica TORPEDO-Rijeka	Diesel engines 26 - 29 kw		locally produced
24.3.3.	INT-Rakovica TORPEDO-Rijeka	Diesel engines 30 - 37 kw		locally produced
24.3.4.	INT-Rakovica TORPEDO-Rijeka	Diesel engines 38 - 44 kw		locally produced
24.3.5.	INT-Rakovica TORPEDO-Rijeka	Diesel engines 45 - 59 kw		locally produced
24.3.6.	INT-Rakovica TORPEDO-Rijeka	Diesel engines 60 - 75 kw		locally produced
24.3.7.	INT-Rakovica TORPEDO-Rijeka	Diesel engines 76 - 90 kw		locally produced
24.3.8.	INT-Rakovica FAMOS-Ibraunica TORPEDO-Rijeka	Diesel engines over 90 kw		locally produced

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25.1.		Piston pumps		
25.2.		Membrane pumps		
25.3.		Sprayers		
25.4.		Cardan shaft		
25.5.		Safety		
25.6.		Reduction gears		
25.7.		Spirals		
25.8.		Knife guards		
25.9.		Seats		
25.10		Shafts		
25.11.		Pipes		
25.12		Cabines		





