SECTION 11: AGRICULTURAL MACHINERY

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Original scientific paper

EXPLOITATION EXAMINATION OF MACHINERY FOR HARVESTING CHAMOMILE IN TWO PHASES

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Abstract
The paper covered the exploitation trials for collection chamomile in two phases where drawn collection combine the inflorescence has been used and the line of machines for mowing and gathering stalk of chamomile. Tests were carried out on 48 hectares in the area of the municipality Rankovci drawn combine manufactured by Prima Novi Sad, for the first time applied to cultivated diploid variety chamomile without irrigation in conditions of Macedonia. Exploitation examination covered the quality of work and exploitation parameters of harvest machinery and the obtained results are of great importance for Macedonian agricultural production for the first time.
Key words: Exploitation, combine, harvesting, chamomile.

Introduction

Development of medicinal and aromatic plants in the world has seen steady growth and cultivated land increases, because this kind of plants are of great importance for industrial processing needs of pharmaceutical, medical and cosmetic industry. Progress is seen as a result of the improvement of structures of various agricultural machines, and their working proces is performed almost completely mechanized by introducing modern production technology for our farmers greatly facilitates work processes with increased cost and increased accuracy in work .Progress notes and the fact that the world's factories, and even the smaller manufacturers of this type of machinery, constantly perfecting machines for individual work processes in terms of quality and economy makes it possible to obtain high productivity in the work, but also to increase the area of these plants. Here in Macedonia have a long tradition of individual cultivation of medicinal and aromatic plants, only certain areas and several individual small firms that are engaged in this activity. For now, the possibilities are used about 1% of all domains. Few years ago, we show interest in increasing the surface and parallel to it and the need for introduction of new machinery in the cultivation of these crops.

Material and methods

Exploring were performed in a production conditions in the Republic of Macedonia, in the municipality of Rankovce an area of 40 hectares in the fields with diploid varieties of chamomile, sowing was carried out in the autumn, in optimal term with proper agrotechnical measures, in October 2011. For collecting the vintage was engaged drag harvester with tractor type and model VB 2002 manufactured in the factory receives in Novi Sad (Pajić M. et al 2005), collecting

inflorescence of chamomilla. Collecting stems of the chamomilla was done with the other line on the machine: Disc mower, Rotary rakes and Balers. This way of production of chamomila has been certificated as organic production.

Subject of examination

As an immediate goal and the reason for this exploration, was to be examined exploitation research in the locations and the quality of the machine work on the lines in the vintage of chamomile, including all terms in Republic Macedonia. Certainly, obtained results are reason to these machines gradually to affirm which will lead to an increase on the surface of producing the various types of medicinal and aromatic plants.

Methods and technique of examination

During the exploration, methodology and technique work was divided into two parts. In the first part were investigated exploitative features towed combine harvesting inflorescence, with quality work. The second part was examined line machines to collect the stems.Exploitation characteristics Combine that throughout the tests was drawn tractor IMT 539, were recorded all default parameters measured in production conditions with five repetitions, where you can see what kind of results obtained in manufacturing conditions. Quality of work performed recording the condition of the crop in terms of number of plants per m^2 their height, weight, number of flowers in different locations of the parcel with 5 samples taken at random blog system gave real situation he mean by parameter. Weeds are also exploring, their number representation, which gives an indication of the work combine as exploitation features and quality of work.

Quality of work were examined number selected socvetija completely and incompletely collected fallen country other. Loss of mass in the stem and flower were also measured, because the purpose of the investigation was set with any loss at optimal regulation combines, to give satisfactory result, because all measurements and tests were performed at the optimum speed of movement of 3,4 km / h, which is defined as the most appropriate speed in the working conditions for all measurements and parameters.

After collecting inflorescences was used line of machines for collecting stems. Rotary mower with rotary therefore, rotary rakes, pick up-press (balers) were three types of machines that perform the collection of stems.On this tree tipes od mashines, were examined exploitation features with productivity at work the entire surface.

Results and discussion

I-Phase on harvesting

All results obtained by measurements carried out directly in the field, during the execution of working process, and some samples have been measured in the laboratory DOOEL "Coro Company" from Skopje, which was also the carrier of all activities. The entire plantation was seeding in October 2011, with a properly executed agro-technical measures, quality seeds, but in dry conditions.And later, after seeding in the next two months, without rainfall, it contributed some plants about 20% before winter, to germinate, but in this phase they are not ready for winter, with above-ground part and root system, other plants were germinate in the spring and crop at certain places there was sufficient density, certain places where the plant had increased moisture from chamomile were rare. Our plantation was ready until the end of May, and we had diverse plants as per number of plants per square meter at their height, and number of inflorescences per plant.

Table 1. Condition of the crop before harvest

Number of plants per m^2	Weight g/m^2	Number of weeds per m^2	Height weeds cm	Height chamomile cm	Number of inflorescences per m^2
92	246	24	10-42	18-34	1730

Harvest was carried out a total of 5 days, in the period from June 20 to 26, with towed combine attached on tractor IMT 539. During the work we noticed that combines requires a tractor with greater pulling power, but at that point we didn't have tractor 539 satisfactorily serve the Combine, which had a working grip of 2 meters, fitted with it's technical features. During this harvesting,we didn't have any problem with combine, because chamomila plant's were rare, and the cuting inflorescences as easy. (Brkić et al., 1998). The average work speed was 3,4 km / h (Table 2), and it was notice that the entire surface, aggregate was moving at a constant speed, because the surface was well-prepared, no bumps which created favorable conditions for the operation of the combine. From the Table 1, it is evident that the samples taken average per square meter, we have a green mass of 246 grams, which shows that the number of plants per square meter 98, that all the plants were not equally developed, or at the very measurements we noticed that some plants had about 20 inflorescences, and some 200. The unequal development of the plants had no impact on the quality and exploitative features combine his device properly collected florescence at the average speed unnoticed congestion pickup device.

During the work the organization was set up in terms of spillage coffin with agegatot had many empty movement, because drying was carried out in solar energy dryers, set in several places of the parcel. Therefore, aggregate showed result koenficient beneficial effect of 0.78 for 8 hours of working time and production of 0.53 acres per hour.

Table 3 shows the results of the quality of work with measurements at different locations of the parcel with several iterations.

Table 2. Displaying exploitation features combine Prima

Working width (m)	Working speed (km/h)	Coefficient of efficiency Production	Production (ha/h)	Production for 8 h
2	3,4	0,78	0,53	4,4

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Table 3. Quality work combines Prima

Fallen florescences		Other uncollected florescences plant		Uncollected florescences m^2	
number	%	number	%	number	%
4	0,23	132	7,6	14	0,80

During the work as well as the tests themselves noticed, that the combines header collect all florescences with height greater than 9 cm from the ground. From the table we see that uncollected florescences per square meter average of 14 numbers of measurements, and the knowledge that it is not florescences that appliance and fell to the ground but florescences that their height is under 9 inches and the header does not embarked or florescences that of a minor branch had fallen to the ground, but the percentage of the total number of florescences in the table is 0.80. During the tests, we noticed that fallen florescences on the ground that the average amount 4 or percentages 0.23, it was generally not properly shaped florescences, which have a very low specific mass and even appeared in the last days of work a particular place parcel which were half dry. Collection device probably has accepted disassociated, but additionally were dropped because as we have mentioned, about 60% were dehydrated.

If we analyze the data in Table 3 for quality work we can see that the total loss Combine during exploitation average is 1.03%, which is quite satisfying and losses methodological eksplataciono tolerant. From the results of Table 3 shows that per square meter found 132 florescences that biologically are not shaped like florescences as previously mentioned for the dry autumn period phenophase plant were mixed in the spring, so probably the florescences that appeared in later period covered by dry days were unable to fully form less humidity, the device could not affect collection. The number of 132 numbers or 7.6% of this category of florescences should not be neglected, where these florescences are not placed in the figure shown in Table 1 for the total number of florescences per square meter before collecting harvest. It is quite normal because of the trials themselves conclude that these are florescences that can not be taken under any category, as a loss Combine.

II-Phase on harvesting steam of chamomile

After collecting the florescences, therefore perform collection stems as a second stage (phase). First machines that we use was rotary mower which exploitation characteristics are shown in Table 4. Rotary mower has given us very good results, that the plant chamomile do not have a very high density, and stems were completely dry, with the mower worked in second gear fast, and the table shows that the working speed has been 5,8 km / h.Stems-quarter was very weak and we were forced to apply sun rotary rakes which two three-quarter merge in one swath. We did this in the next day, because the harvest period, temperature that day reach up to 38^0C, and harvested the next day it was completely dry, and thus got the improved exploitation features rotary rakes and balers and economy in operation. The results are shown in Table 4.

Table 4. Exploitation characteristics

Type of machine	Working width	Work speed	Coefficient of efficiency Production	Production ha/h	Production for 8 h	Trees dry mass per hectare
Disc mower	2	5,8	0,75	0,87	6,9	670 kg/ha
Rotary rakes	4,5	6,1	0,75	2,05	16,4	
Balers	4,5	6,0	0,75	2,02	16,1	

Conclusions

From the exploitation parameters and the quality of work we can conclude that combine for harvesting chamomole, manufactured by the company EURO PRIMA, (Chamomile harvester VB2002) in terms of R. of Macedonia gives satisfactory results. Of course, these trials were important to us from a scientific and application point of view, but it is important for manufacturers of medicinal and aromatic plants as sign, that the problem of collecting chamomile is already solved with quality machines which precision and tolerance limits loss to collect the florescences and stem can be seen from the displayed results. It gives us the occasion of this culture affects a growing number of areas in the Republic of Macedonia, but gives occasion to bring new machines with new technical solutions that work process or the overall production technology will perform better and more economical.

References

Brkić, D., Lukač, P., Babić, T. (1989). Ispitivanje adaptiranog žitnog kombajna u berbi kamilice. Aktuelni zadaci mehanizacije poljoprivrede, Zbornik radova, I deo, Trogir, 213-221.

Давчев Ж. (2007). Експлоатација на земјоделска техника, основен учебник, 355-390.

Cavazzoni, M.A. (1991). Meccanizzazione della reccolta – Coltavazione della camomilla comune in diverse regioni Italiane, L´informatore Agrario, Verona, XLVII (39), 74-76.

Kojić, M. I drugi. (1997). Kamilica (Chamomilla recutita (L) Rausch.), monografska studija, Institut za proučavanje lekovitog bilja "Dr Josif Pančić"-Beograd.

Martinov, M., Muller, J., Tešić, M. (1994). Mehanizacija za ubiranje, sušenje i preradu lekovitog bilja, stanje i perspektive. Medicinal Plant Report '94, Vol. 1, No. 1, 16-27.

Martinov, M., Oluški, L. (1998). Mašine i oprema za proizvodnju kamilice-Dvadeset godina posle. Medicinal Plant Report, Vol. 5, No. 5, 37-49.

Martinov, M., Tešić, M. (1996). Mehanizovana žetva i prerada kamilice. Medical plant Report, Vol.3, No. 3, 38-51.

Martinov, M., Tešić, M. (1995). Mehanizacija žetve, sušenja i primarne prerade lekovitog bilja, Lekovite sirovine, Vol. XLIV, No 14, 43-55.

Pajić M., Raičević D., Ercegović Đ., Miodragović R., Gligorević K., Radojević R. (2005). Uporedna analiza osnovnih parametara rada mašina za ubiranje kamilice Poljoprivredna tehnika-chasopis, Godina XXX, 55-63.

Radojević, R., Pavlekić, S., Pajić, M., Raičević, D., Oljača, M. (2001). Istraživanje osnovnih parametara rada nošene mašine za ubiranje kamilice, Lekovite sirovine, Vol. XXI, No. 21, 175-180.

Tešić, M., Topalov, S., Veselinov, B. (1982). Naša iskustva o mogućnostima razvoja mašina za branje cveta kamilice, IV Internacionalni simpozijum "Poljoprivredno mašinstvo i nauka", Požarevac, 279-288.

РЕЗУЛТАТИ ОД ЕКСПЛОАТАЦИОНИТЕ ИСПИТУВАЊА НА МАШИНИТЕ ЗА ДВОФАЗНО СОБИРАЊЕ НА КАМИЛИЦА

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Апстракт

Во трудот се опфатени експлоатационите испитувања за двофазно собирање на камилицата при што употребен е влечен комбајн за собирање на цветот, а потоа линија на машини за косење и собирање на дршката од камилицата. Испитувањата се вршени на површина од 48 хектари во реонот на општина Ранковци со влечен комбајн произведен од Прима Нови Сад кој во услови на Македонија за прв пат го применуваме на култивирана диплоидна сорта на камилица, без наводнување. Од експлоатационите испитување опфатени се квалитетот на работа и експлоатационите параметри на машините во двофазна берба при што добиените резултати се од исклучително значение, бидејќи за прв пат во Македонија се употребува оваа линија на машини.

Клучни зборови: Експлоатација, комбајн, жетва, камилица.