UDC: 631.585:635.652
original scientific paper

Acta Agriculturae Serbica, Vol. II, 4 (1997) 81-87

Acta Agriculturae Serbica
FACULTY OF AGRONOMY • ČAČAK •

Dry Bean Producing Technology

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Abstract: Dry bean occupied a major part of the crop area in the country. Dry bean is of utmost importance for fulfilling the national program of food supplies. Moreover, dry bean has also great agrotechÐnical value. In our country dry bean appears to be an important commodity of the food processing industry. Combined with different kinds of meat or without them it is used for preparing various tinned food.

From the beginning of the century the dry bean production in Bulgaria seems to be rather unstable and fluctuating. In the first place this is a result of highly varying and low yields.

The causes arousing the state of the dry bean production are as follows: sowing non-standard seeds, lax planting density being less than the optimal one which leads to considerable decrease of yield, disease and pest attacks and harvesting by means of unsuitable machinery and great breaking of seeds.

The investigations conducted in our country allow to recommend suitablle dry bean producing technology.

Key words: dry beans, varietles, field, tillage, fertilizer, sowing, machines, plant protection, harvest, harvesting machines.

Introduction

Dry bean occupied a major part of the crop area in the country. Dry bean is of utmost importance for fulfilling the national program of food supplies. Moreover, dry bean has also great agrotechnical value. In our country dry bean appears to be an important commodity of the food processing industry.

Combined with different kinds of meat or without them it is used for preparing various tinned food.

Dry bean is one of the main exports being successfully marketed and proved to be one of the most profitable agricultural export products of great currency reimbursement as well.

Up to now in our country almost the same varieties have been actually sown. At present the varieties Dobroudjanski 7, Dobroudjanski 2, Prelom, Rousse 13 and Abritus are the most widespread in the country.

Technological Requirements

Choice of Field

Suitable predecessors for bean proved to be the winter grain crops such as wheat, barley, triticale and rye.

Fields weedy with rootstock weeds and fields with a predecessor treated by triazine herbicides are not suitable for growing bean. It is not recommended sowing bean on soils of heavy mechanical composition disposed to over moistening, with acid reaction or having been fertilized with high nitrogen rates. It is also not allowed sowing to be made on spring plowed areas.

Unsuitable predecessors for bean proved to be sunflower and the leguminous crops. In the crop rotation bean is to be sown following bean itself after 3-4 years.

Tillage

The tillage system should provide the accumulation of great autumn-winter storage of moisture, good temperature regime and easier cotyledon appearance over the soil surface. This is a prerequisite for a more intensive microbiological activity especially of the tuberous bacteria that are closely related to suÐpplying the plants with nitrogen.

Main tillage should be done immediately after harvesting the predecessor, i.e. deep plowing at a depth of 26-28 cm.

Now, an important and imperious measure to be started with is the spring tillage including early spring harrowing and subsequent cultivation with haÐrrowing and leveling of the area. For that purpose tilth harrows and cultivators for complete cultivation are used which should meet the agrotechnical requirements. The depth of the last cultivation should be equal to the sowing depth.

An obligatory measure to be taken prior to sowing is leveling of the area, whereas after sowing it is necessary to do the rolling.

Fertilization

Bean is characterized by its nitrogen fertilizer response. However, since bean could partly satisfy its nitrogen demands via biological means nitrogen

fertilization is applied at reduced fertilizer rates - up to 4-6 kg/decare in active substance, or it is excluded in case where the predecessor has been fertilized with increased nitrogen doses. The most suitable fertilizer used for this purpose seems to be sodium nitrate. Provided that the natural population of the tuberous bacteria is of insufficient virulence and nitrogen fixing activity, it is advisable to apply bacterial fertilization by semi-moist treating the seeds with the chemical nitragin on the sowing day in a place protected from direct sun rays. Bacterial fertilization may be combined with molybdenum microfertilization. Molybdenum has a positive effect on the vitality of the tuberous bacteria. The molybdenum chemicals sodium or ammonium molybdate are used in a dose of 5-10 g/dca in active substance. Phosphorus as well potassium fertilization have a slighter effect on the yield, yet they could improve the produce quality. Triple superphosphate and potassium chloride in a dose of 8-10 kg/dca in active substance are used and applied in autumn prior to deep sowing.

Sowing

Only undamaged seeds, non-infected with diseases are sown and they must meet the standard - 98-99% purity and germination being not less than 90% for the first grade.

Bean is sown when the 10 cm soil layer reaches a temperature of 10-12° C. For the South Bulgaria it usually occurs within 10th and 20th April and for the remaining part of the country during the last 10 days of the same month. It is not recommended to begin sowing earlier because of the risk of seed damages caused by over moistening of the soil as well as by germ injuries inflicted by late spring frosts.

Solid sowing, sowing in bands and sowing in rows proved to be appropriate for bean. Solid sowing is applied with varieties suitable for one-phase harvesting (Prelom and Abritus). The row spacing with the solid and band sowing is 15 cm. With the band sowing the band width is 90 cm and the band spacing 70 cm. When herbicides are lacking sowing could be done in rows and the row width spacing has to be 45 cm, taking into consideration that yields may decrease by applying this sowing technique. Sowing depth ranges from 4 to 8 cm depending on the seed size, soil moisture and soil temperature. On lighter soils a deeper sowing could be made. Crop density varies from 35000 to 45000 plants grown per decare, depending on the variety, which may be achieved by sowing from 40000 to 50000 germinated seeds per decare according to their agronomic qualities.

Sowing Machines

There are not special machines designed for sowing bean. Pneumatic seeders for proper sowing the root crops are not used when sowing bean, as they could provide row spacing of 70 cm or a minimum one up to 45 cm.

In practice, sowing is done by using grain drills adjusted for bean. Depending on the sowing scheme grain drills are adjusted for sowing in bands or in rows (solid sowing).

Adjustment of grain drills comprises alternation in the construction, when sowing in bands, adoption of the reduction gear for operating the feed seed mechanisms, regulation of the bottom valves, changing the seed divider of the disk furrow openers for an extension additionally made, or replacement of the disk furrow openers with runner-type ones, coil spring regulation of the disk furrow openers, installation of an additional dragshovel etc.

Plant Protection

Besides the climatic factors and the growing technology diseases of dry bean exert a significant influence on the produce quantity and quality of the crop. Over the past years the diseases being of great importance for bean production are as follows: Bacterial blight(*Xanthomonas campestris pv.phaseoli*, Smith, Dye), anthracnose (*Colletotrichum lindemuthianum,* Sacc.&Magnus, Lams-Scrib), sclerotinia (*Sclerotinia sclerotiorum*, Lib, de Bary) and the root rot.

Investigations conducted in our country as well as abroad suggest that in conditions favorable for the pathogen development the percentage of bacterial infection envisaged by the BSS may lead to the epidemic development of the bacterial blight.

Anthracnose in bean is a problem for Bulgaria only in cool and rainy years.

During the past years, when increasing the sunflower areas, conditions have been created for considerable accumulation of *Sclerotinia sclerotiorum and Macrophomina phaseolina* inoculum, which appear to be pathogenic for several crops including the bean.

The most important bean pest proved to be the bean-seed beetle(*Acanthoscelides obsoletus*). The species develops 4-6 generations every year. The first generation develops in the field, whereas the others in the warehouses.

In field conditions the bean-seed beetle attacks bean during the second half of July with the beginning of pod ripening.

Warning of pest control is given when at 100 strokes 4-5 beetles have been caught by means of a standard entomological bag during the pod maturing period. The observation is repeated after one week. When 2 beetles have been found at 100 strokes the treatment is repeated. The following insecticides are applied: aktelik 50 EK - 120ml/dca; decis 2.5 EK- 40ml/dca; oleofen 205-500ml/dca; tokution 50 EK-100ml/dca; chloracetofon 50 EK - 150ml/dca. To carry out the pest control over the bean- seed beetle the seeds are gas- treated with fostoksin-12-15 tablets/1ton of grain; delicia gastoxicant - 2 packets/1ton of grain.

The investigations conducted in our country allow to recommend suitable herbicides as well as their combinations and systems in order to carry out effective weed control in bean and to reduce the cultivation during the crop vegetation to a large extent.

Against the annual grain weeds treflan(agriflan) or balan(balagrin) could be used, applied two-three days prior to sowing via incorporation.

In areas weedy with wild mustard(*Sinapsis arvensis* L.), wild radish(*Raphanus raphanistrum* L.), chamomile(*Chamomilla* L), black nightshade (*Solanum nigrum*) and others afalon, patoran or pivot should be used, applied two-three days after sowing the bean.

In cases of slight effect of the soil herbicides during the bean vegetation vegetative herbicides may also be applied.

Harvesting Machines

Two-phase or with suitable varieties one-phase bean harvesting is done. The beginning as well as the duration of harvesting are determined depending on the crop condition, seed and stem moisture and on the harvesting technique.

The mowing machine KF-1.6 is designed for plant cutting below the soil surface from one bed and it is used for two-phase harvesting. Afterwards it is necessary to do bean plant cutting by means of special plantliners. The reaping machine JSB-4.2 is designed for harvesting the plants above the soil surface. The operating width is 4.2m and simultaneously performs plant cutting.

Grain harvest combines being necessarily adjusted are used for selecting and threshing the bean. The rotary combines of Keis type are preferred in regard to reducing the seed damages.

Conclusion

From the beginning of the century the dry bean production in Bulgaria seems to be rather unstable and fluctuating. In the first place this is a result of highly varying and low yields.

The traditions and the gained experience of growing dry bean seem to be the most valuable in North-East Bulgaria, where during the last years till 1990 about 84 % of the areas as well as 80-90% of the bean production were concentrated.

The causes arousing the state of the dry bean production are as follows: sowing non-standard seeds, lax planting density being less than the optimal one which leads to considerable decrease of yield, disease and pest attacks and harvesting by means of unsuitable machinery and great breaking of seeds.

The investigations conducted in our country allow to recomme-nd suitablle dry bean producing technology.

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PROIZVODNA TEHNOLOGIJA PASULJA

- originalni naučni rad -

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Rezime

Pasulj zauzima najveći deo površina pod povrtarskim usevima u zemlji. Ima ogroman značaj u realizaciji nacionalnog programa za obezbeđenje hrane. Pored toga, odlikuje ga i visoka agrotehnološka vrednost. U našoj zemlji, pasulj je najvažniji proizvod namenjen za prerađivačku industriju. Kombinovan sa raznim vrstama mesa ili bez njih, koristi se za spravljanje raznovrsne konzervirane hrane.

Proizvodnja pasulja u Bugarskoj je, međutim, prilično nestabilna i oscilirajuća od samog početka ovog veka. Ovo je, pre svega, rezultat izrazito varirajućih i niskih prinosa.

Uzroci, koji su doveli do ovakvog stanja u proizvodnji pasulja, su: sejanje nestandardnog semena, znatno manja gustina useva od optimalne, što je dovelo do izrazitog pada prinosa, bolesti i štetočine, zatim berba neodgovarujućom mehanizacijom kao i ogromno lomljenje semena.

Istraživanja vršena u našoj zemlji upućuju na potrebu korišćenja nove proizvodne tehnologije pasulja.