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# The influence of different sowing dates on the production of green biomass of green manure

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**Annotation:** In the experiment, when different green manure crops like peas, chick peas, rape and barley were planted as green manure in grain- free fields were sown in the summer on July 10, July 20, July 30 and in autumn on October 10, October 20, October 30, as well as in summer (July 10), high green biomass yield was 14.54-52.92 t/ha relative green biomass yield was observed on July 20 and green biomass yield constituted 14,10-50,73t/ha.

Кузда турли сидерат экинларини 10, 20, 30 октябрь муддатларида экиб ўрганилганда, 10 октябрда ғўза қатор орасига экилган Peas, Chick peas, Rape ва Barley вариантларида ҳосилдорлик юқори бўлиши, бунда 6,44-22,41 т/га ни ташкил этди, кейинги ўринда эса 20 октябрда кузатилди.

When different green manure crops peas, chick peas and rape and barley planted on October 10,20,30 was observed to be high between the rows of cotton in autumn, the productive yield was high sown on October 10 and constituted 6,44-22,41 t/ha and the yield on October 20 was after then. In this case green biomass equaled to 6,04-21,91 t/ha.

***Key words: various sowing terms, green manure crops, biomass, fertility***

## INTRODUCTION

The research focused on the cultivation of inter crops and second crops and their application for the purpose of green manure, the development of technologies for their use in cotton is being conducted in the world's leading research centers and higher education institutions, including the United States Department of Agriculture (USA), the University of Texas School of law (USA), University of Cordoba (Spain), SCPA; ITCF; EDP Sciences(France), Herbert Publication Limited; Inderscience Enterprises LTD (England), Springer Science +Business Media; Physiological and Pharmacological Society (Germany), Agricultural Academy of Bulgaria (Bulgaria), Chinese Cotton Research Institute (China), Indian Central Institute for Cotton Research (India).

For this purpose a number of scientific results have been achieved on improving soil fertility and cotton yield as well as to increase of the efficiency of green manure(sideration)

technologies in the world research, including the following : developed technology for growing inter and second crops at different times (The University of Texas School of law (USA);) due to the application of this technology, the yield of cotton has increased by 12-15%, fiber yield and quality (Chinese Cotton Research institute

(China)), Indian Central Institute for Cotton Research (India); the positive effects of green manure on many physiological and biochemical processes in plant (University of Cordoba (Spain)), (SCPA; ITCF; EDP Sciences (France)), (Chinese Cotton Research Institute)(China), (Indian Central Institute for Cotton Research(India).

Cultivation of inter crop and second crop technologies has been developed for sowing at different terms (The University of Texas School of Iaw (USA)); due to the application of this technology, fiber output and quality of the cotton yield has been increased by 12-15 % (Chinese Cotton Research Institute (China)), (Indian Central Institute for Cotton Research (India)); the positive effect of green manure has been identified in plant on many physiological-biochemical processes at (University of Cordoba (Spain)), (SCPA; ITCF; EDP Sciences (France)), (Chinese Cotton Research Institute (China)), (Indian Central Institute for Cotton Research (India)).

Researches are being conducted in the world on a number of priorities, including the preservation of soil fertility, increasing the effectiveness of green manure:

Research is being conducted in the world on a number of priorities, including the preservation of soil fertility, increasing the effectiveness of green manure; expand the selection of inter crop and second crop varieties that can be used for sideration, mass-producing, improvement of their cultivation technology; the role of green manure in increasing soil fertility, improvement the agropgysical and agrochemical properties of soil; improvement of agro-technologies that improve soil properties; development of resource and energy saving technologies.

Also, in their experiments by conducted Kh.Botirov, T.Fayziev [1. 100-102- pp], 100-110kg of barley, 10-12 kg of oil radish, 60-70 kg of peas, 50 % of the norm was obtained when sowing their mixtures, and in the free-barley areas, the row spacing was 60 cm by using SPCh-6 seeding machine, the green manure crops formed a complete biomass by the end of August.

During this period, the biomass yield was 19.5 t/ha in barley, 41 t/ha in oilseed radish, 30 t/ha in oats, 36.6 t/ha in oily radish+barley, 32.1 t/ha in oily radish +peas.

In the experiments by M.Tojiev, K. Tadjiev, T.Mamaraimov[2. 89-90- pp], barley sown after winter wheat was 221 pieces of plant per 1 $m^2$ of the land treated as green manure, plant height was 97 cm and 6.1 leaves per plant while in barley +mung bean variant the indicators were 213/16 pieces, 94/56 cm and to be 5.7/32 pieces were found.

Sowing terms significantly affect the topsoil and root system of barley which sown in autumn.

When planted in the early period(1.X) it was observed that the mass of the root system and the above ground part was the highest. [Nurbaev S. 3. 98-99-p.].

When green manure crops are grown for seed, sowing is carried out in two periods- autumn (second ten days of October) and spring (first ten days of February), and sowing norms are: 12-15 kg/ha for simple row sowing 6-8kg'ha for wide row sowing, 2-3cm; for barley -120 kg/ha, 5-7 cm, for green peas (chick peas) – 35-50kg/ha, 6-8 cm; for oily radish-20-25 kg/ha were done at a depth of 2-4 cm.

Before sowing $N_{30}P_{100}K_{60}$ kg of fertilizer in the form of active substance is applied, autumn green manures are fed with $N_{30}$ in early spring.

Autumn green manures are irrigated 2 times in autumn and 1 time in spring (500-600 $m^3$ /ha), and spring green manures are irrigated 4 times during the growing season. [N.Usmonov,, 4. 46-48-p.].

In Z.Jumaboev, O.Muminov experiments it was achieved to get of [5. 43-p.] inter crops and forage crop seeds- autumn mustard (mustard) -12 kg/ha, barley -160 kg/ha, two component triticale+ rapeseed 140+10 kg/ha, three-component triticale + rape+ 100+ 10+50 kg/ha for vica and 80+15+35+40 kg/ha for four component triticale + rapeseed + vica+ peas and 80+10+45+10 kg/ha for triticale +rape + peas + respectively, the yield of mustard was

292.2 c/ha, barley was 395.2 c/ha, two -component -425.3 c/ha, three-component -445.3 c/ha, four - component-476.9 respectively and a green mass yield of 495.3 c/ha.

However, in our country, conducting research in priority areas such as the research taking into account the natural soil and climatic conditions of green manure crops, the selection of varieties suitable for their cultivation for different purposes (primary, secondary crop, fodder, mulching), the use of optimal seed sowing times to increase the yield and quality of green manure crops is an urgent task

## RESEARCH METHODS

Conducting field experiments, crop planting, caring for crops, harvesting and analysis were used by generally accepted Uzbek Scientific Research Institute of Botany (1986); the methods of Uzbek Cotton Research Institute (1981,2007).

In order to carry out the set tasks, the field experiments were carried out in the conditions of meadow-gray soils of the farm" Avliyotepalik Ismail MAL" of Ishtikhon district of Samarkand region.

Field experiments were carried out in the conditions of old-irrigated, cultivated, meadow- gary soils with an average sand content of sand, groundwater level at a depth of 3-4 m.

Field experiments were conducted in 9 variants 4 replications. The surface area of each pile in the experiment was 240 $m^2$ (the length was 50m, the width was 4.8m) the calculated area was 120$m^2$ and the piles were systematically arranged in a single tier. The experimental green manure crops were pea variety of "Osiyo 2001", perspective fodder chick peas sample "K-295"(fodder nigretum), "Regina" veriety of rape, "Temur" of barley veriety were selected.

Field and production experiments, crop planting, care, harvesting and analysis of crops were carried out according to the manuals of "Methods of field experiments" and "Conducting methods of field experiments" the methodical manual "Methods of agrochemical, agrophysical and microbiological research in irrigated cotton areas" was used in carrying out of agrophysical analysis in practice (1963). Data obtained from the field experiments based on B.A.Dospekhov method was analyzed by the help of mathematician statistical of Microsoft Excel.

## EXERIMENT RESULTS

### Favorable planting terms and yields of green manure crops

The use of intercropping systems as organic fertilizers for the purpose of sideration, in addition to filling their gaps, in terms of effect does not remain manure, compost and other organic fertilizers.

Today, the use of organic fertilizers in the world agricultural practice, obtaining quality and high yields from crops on the basis of maintain, restoring and increasing soil fertility remains one of the most pressing issues.

The solution to this problem can be achieved by planting and caring for green manure crops at different terms in summer and autumn, and driving the resulting of the green mass into the ground as a green manure.

As a result of this measure, the soil will be enriched with environmentally friendly, inexpensive high-quality organic biomass [R.Aripov 6. 25-82-p., E.P.Gorelov., R.Aripov., 7. 15-17-p.].

In the experiment, various green manure crops were sown and studied in the fallow areas in summer on July 10, July 20, July 30 and in autumn on October 10, October 20, October 30.( in the pictures it is interpreted as 1,2 and 3 decades).

Scientific studies have shown that the accumulation of green biomass in green manure crops also depends on the timing of its cultivation.

Before drilling the pea plant as green biomass in summer grain-free areas on July 10, the average plant height was 116.9 cm and the yield of green biomass per 1 $m^2$ 1454g or 14.45 tons per hectare.

This was 2.7cm of plant height compared to July 20, 53g of biomass per $m^2$ or 0.53t/ha more per hectare, compared to 4.8 cm, 252 g or 2 per hectare compared to July 30 allowed to yield accumulate more than 52 t/ha of mass.

The same figures were observed in the varieties of peas, barley and rapeseed when planted on 10 July.

If it is compared to options sown on July 20 and 30, the green biomass was 0.44-1.26 t/ha in peas, 2.0- 6.64 t/ha in barley and 2.19-8.95 t/ha in rapeseed (Table 1).

**Table 1**

**The influence of summer sowing terms on the height and yield of green manure crops (2014-2015.)**

| № | Sowing time | 1 $m^2$ number of pieces, pcs | Plant hieght, cm | | | 1 $m^2$ number of pieces, pcs (before drilling) | Green mass, g/$m^2$ | | | fertility, t/ha |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | ẍ | tSx | V, % | | Top soil | Undue ground | totally | |
| Peas | | | | | | | | | | |
| 1 | July 10 | 90 | 116,9 | 6,3 | 5,4 | 88 | 1192 | 262 | 1454 | 14,54 |
| 2 | July 20 | | 114,2 | 6,1 | 5,3 | 86,5 | 1156 | 254 | 1410 | 14,1 |
| 3 | July 30 | | 112,1 | 6,6 | 5,9 | 85 | 986 | 216 | 1202 | 12,02 |
| Chick peas | | | | | | | | | | |
| 1 | July 10 | 90 | 52,6 | 3,1 | 6 | 88 | 1247 | 274 | 1521 | 15,21 |
| 2 | July 20 | | 50,1 | 3,1 | 6,2 | 86,5 | 1211 | 266 | 1477 | 14,77 |
| 3 | July 30 | | 47,7 | 2,7 | 5,8 | 84 | 1144 | 251 | 1395 | 13,95 |
| Rape | | | | | | | | | | |
| 1 | July 10 | 250 | 115,4 | 7,1 | 6,2 | 248,5 | 4339 | 953 | 5292 | 52,92 |
| 2 | July 20 | | 112,1 | 6,6 | 5,9 | 246 | 4160 | 913 | 5073 | 50,73 |
| 3 | July 30 | | 108,6 | 6,7 | 6,2 | 242,5 | 3606 | 791 | 4397 | 43,97 |
| Barley | | | | | | | | | | |
| 1 | July 10 | 350 | 80 | 4,5 | 5,6 | 348 | 3236 | 710 | 3946 | 39,46 |
| 2 | July 20 | | 78,9 | 4,4 | 5,6 | 345,5 | 3072 | 674 | 3746 | 37,46 |
| 3 | July 30 | | 76,9 | 4,2 | 5,5 | 342,5 | 2691 | 591 | 3282 | 32,82 |

| | 2014 y. Peas | Chick peas | Rape | Barley | | 2015 y. Peas | Chick peas | Rape | Barley |
|---|---|---|---|---|---|---|---|---|---|
| $S_{\bar{x}}\%$ | 3,13 | 3,41 | 3,45 | 3,46 | $S_{\bar{x}}\%$ | 4,05 | 2,75 | 3,58 | 3,59 |
| $LSD_{05}$ | 2,28 | 2,44 | 4,55 | 3,92 | $LSD_{05}$ | 2,54 | 2,20 | 4,56 | 3,95 |

Therefore, the optimal time is for sowing green manure crops in the summer on July 10.

One of the main reasons for this is that when planted on July 10, the plants grow well, barley yield accumulates well, peas and rapeseed have good shooting, tall height, strong root system, high green biomass is obtained as a result of growth and development as well as timely plowing of the land without autumn precipitation is achieved.

As a result, the green biomass completely compost and cotton is planted in its place, full and partial germination of cotton seedlings will be achieved and hoped to get high yield.

Winter hardiness of plants has a significant impact on productivity.

Winter hardness is an indicator that varies depending on the biological characteristics of variety, the temperature regime in the winter, the phase of development of the plant, moisture content, the norm of sown seeds as well as sowing terms [B.M.Khalikov., 3. 44-p.].

The results of the study showed that before drilling the green biomass of rapeseed planted in the soil on October 10, the average plant height was 97.1 cm, the green mass yield per 1m2 area was 2241 g or 22,41 t/ha compared to the plant which planted on October 20, the plant height was 7,5 cm, green biomass yield was 50 g or

0.5 t/ha, and plant height was 12. 7 cm, green biomass yield was 278 g or 2,78 t/ha more than when planted on October 30.

These figures were also found to be higher in peas, chick peas and barley which planted on October 20.

Also, in comparison with the options sown on October 20 and 30, the yield of the green biomass in the variant of peas sown on October 10 was 0.50-2.8 t/ha high, 0.35-1.2 t/ha in chick peas and 1.35-2.62 t/ha in barley (Table 2).

One of the main reasons for this is the early germination of the plant, the achievement of optimal seedling thickness which ensures high green biomass yield due to the favourable development of plants.

The green biomass crop of these green manure crops was crushed and drove in early spring, i.e during the barley sprouting phase and flowering as well as fruiting phase of peas, chick peas and rapeseed.

Such an organic mass quickly composts and mineralizes when driven into the ground. As a result, favourable conditions are created for good growth and development of the cotton crop planted in its place, which ensures high yield.

In conclusion, when peas, chick peas, rapeseed and barley were sown as green manure crops in the summer on July 10, the highest biomass yield was 14.54-52.92 t/ha, relatively followed on July 20, the green biomass yield was 14.1-50.73 t/ha.

In the green manure crops sown in autumn, high biomass yields were observed when sown on October 10, with 6.44-22.41 t/ha followed by October 20. The productivity of the green biomass was 6,04-22,91 t/ha. (Table 2).

**Table 2**

**The influence of autumn sowing terms on height and yield of green manure crops (2014-2015 .)**

| № | Sowing time | 1 m² number of pieces, pcs | Plant height, cm | | | 1 m² number of pieces, pcs (before drilling) | Green mass, g/m² | | | fertility, t/ha |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | ẍ | tSx | V,% | | Top soil | Undue ground | totally | |
| Peas | | | | | | | | | | |
| 1 | October 10 | 90 | 79,4 | 4,1 | 5,2 | 87 | 528 | 116 | 644 | 6,44 |
| 2 | October 20 | | 77,2 | 3,7 | 4,9 | 85 | 495 | 109 | 604 | 6,04 |
| 3 | October 30 | | 73,2 | 3,7 | 5 | 82 | 465 | 102 | 567 | 5,67 |
| Chick peas | | | | | | | | | | |
| 1 | October 10 | 90 | 39,3 | 1,9 | 4,8 | 87 | 581 | 128 | 709 | 7,09 |
| 2 | October 20 | | 35,6 | 1,7 | 4,9 | 86 | 554 | 122 | 675 | 6,75 |
| 3 | October 30 | | 33 | 1,7 | 5,2 | 82 | 498 | 109 | 607 | 6,07 |
| Rape | | | | | | | | | | |
| 1 | October 10 | 250 | 97,1 | 5,2 | 5,4 | 246 | 1838 | 403 | 2241 | 22,41 |
| 2 | October 20 | | 89,6 | 4,6 | 5,2 | 244,5 | 1797 | 394 | 2191 | 21,91 |
| 3 | October 30 | | 84,4 | 4,6 | 5,5 | 242,5 | 1610 | 353 | 1963 | 19,63 |
| Barley | | | | | | | | | | |
| 1 | October 10 | 350 | 56,6 | 2,8 | 5 | 347 | 1533 | 336 | 1869 | 18,69 |
| 2 | October 20 | | 54,7 | 2,7 | 4,9 | 345,5 | 1422 | 312 | 1734 | 17,34 |
| 3 | October 30 | | 53,2 | 2,6 | 4,9 | 342 | 1318 | 289 | 1607 | 16,07 |

| | 2014 y. | | | | | 2015 y. | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Peas | Chick peas | Rape | Barley | | Peas | Chick peas | Rape | Barley |
| $S_{\bar{x}}\%$ | 3,29 | 3,45 | 3,46 | 3,47 | $S_{\bar{x}}\%$ | 3,50 | 3,20 | 3,30 | 7,05 |
| $LSD_{05}$ | 1,52 | 1,66 | 2,98 | 2,67 | $LSD_{05}$ | 1,62 | 1,60 | 2,90 | 3,72 |

It can be seen that the optimal time for sowing inter crops as green manure is July 10 in summer and October 10 in autumn which achieves high biomass yield from green manure crops.

When statistically analyzing the relationship between the height, green mass, yield and sowing time of summer and autumn green manure crops (peas, chick peas, rapeseed, barley), there is an inverse of the change in direction, the presence of a linear correlation according to the analytical expression and their subordination of the regression $y = a - bx$ and the correlation coefficient for both summer and autumn green manure were found to be $r<-0,7$.

It has been statistically proven that when plants are grown for summer and autumn green manure, the plants' height is reduced, the productivity decrease with the delay of planting. ( Figures 1-8.).

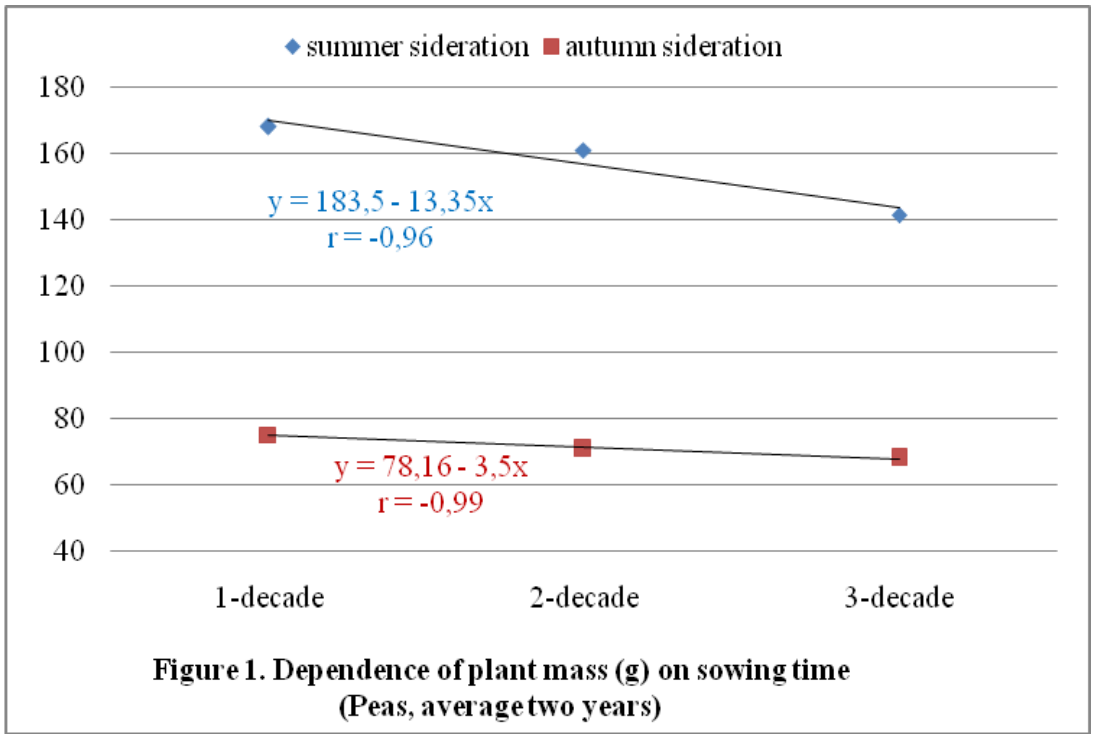


**Figure 1. Dependence of plant mass (g) on sowing time (Peas, average two years)**

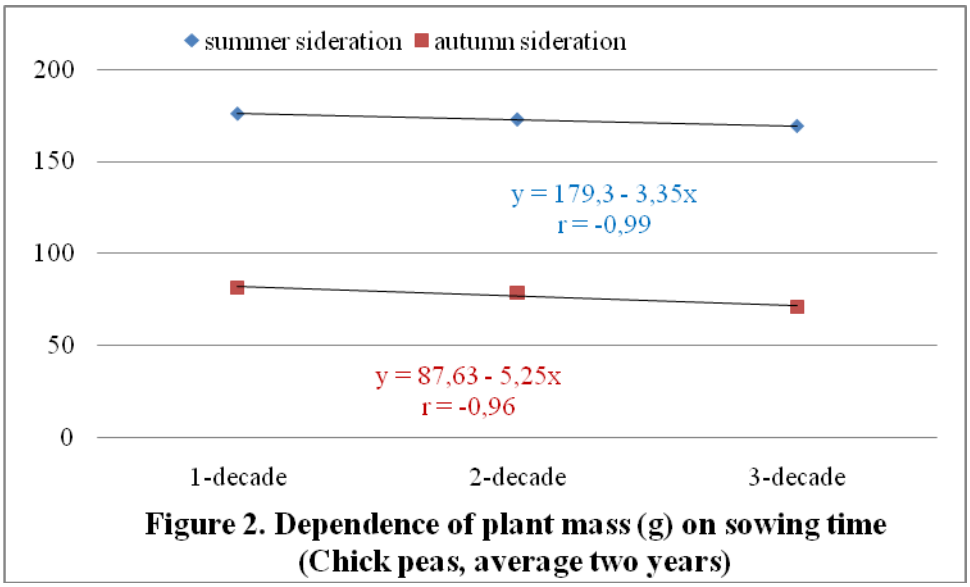


**Figure 2. Dependence of plant mass (g) on sowing time (Chick peas, average two years)**

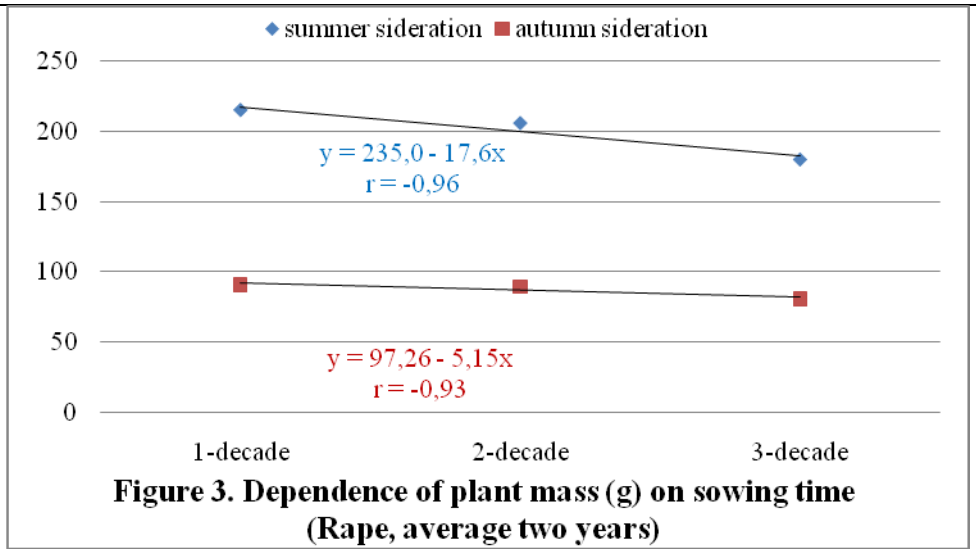


**Figure 3. Dependence of plant mass (g) on sowing time (Rape, average two years)**

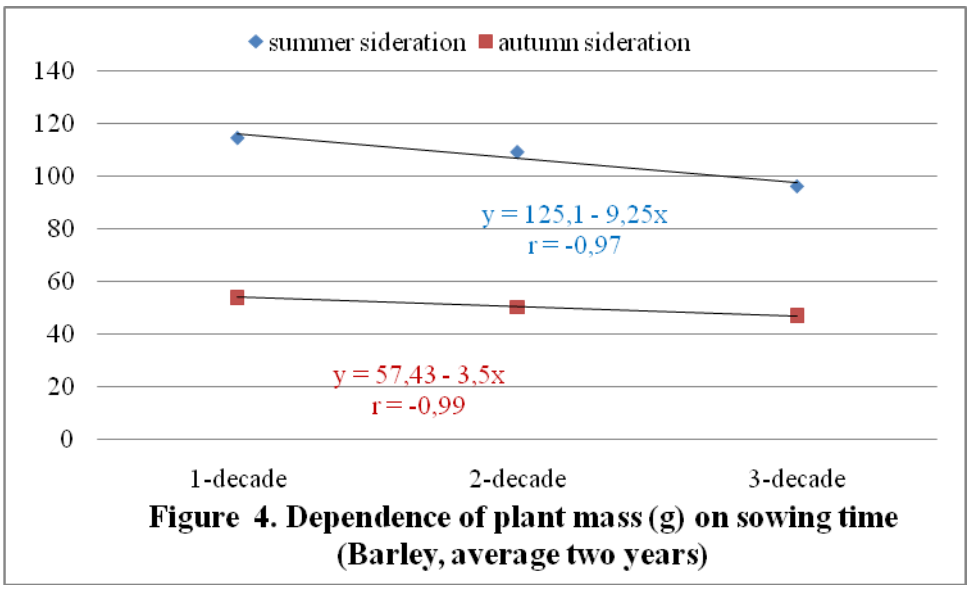


**Figure 4. Dependence of plant mass (g) on sowing time (Barley, average two years)**

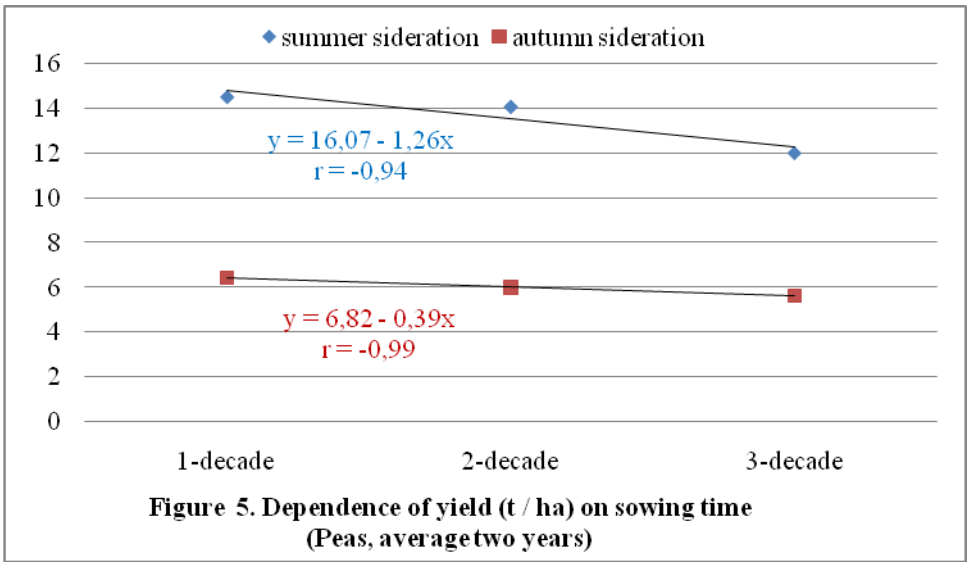


**Figure 5. Dependence of yield (t / ha) on sowing time (Peas, average two years)**

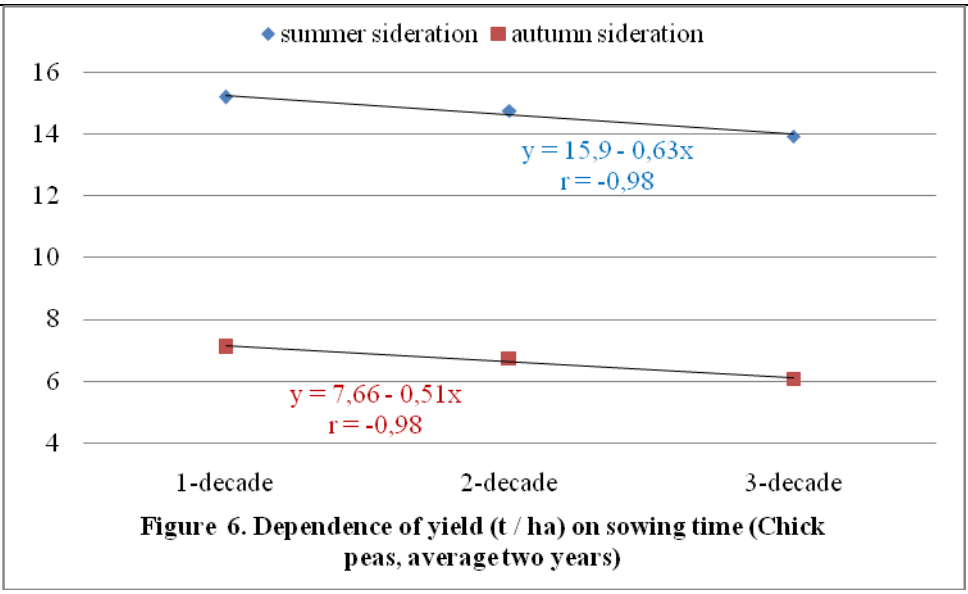


**Figure 6. Dependence of yield (t / ha) on sowing time (Chick peas, average two years)**

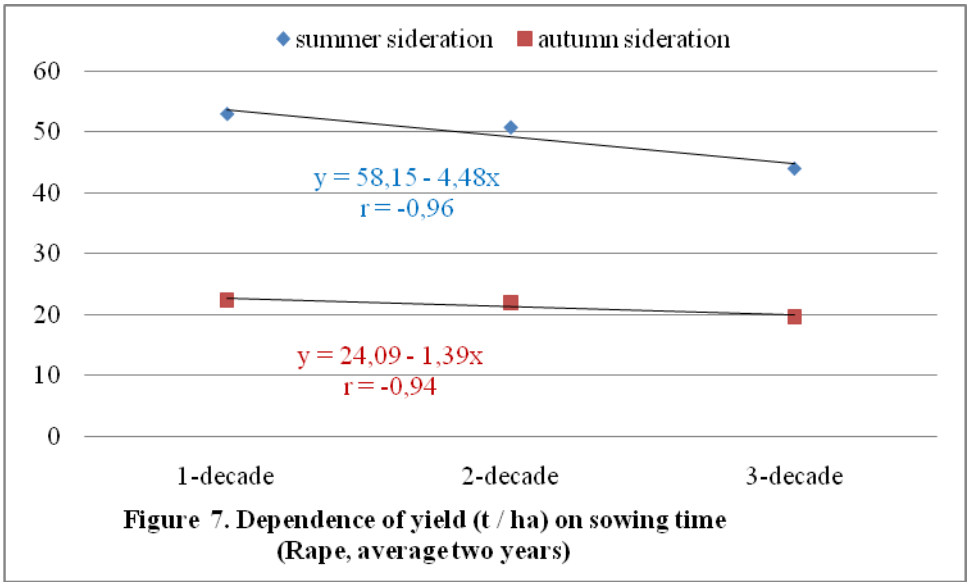


**Figure 7. Dependence of yield (t / ha) on sowing time (Rape, average two years)**

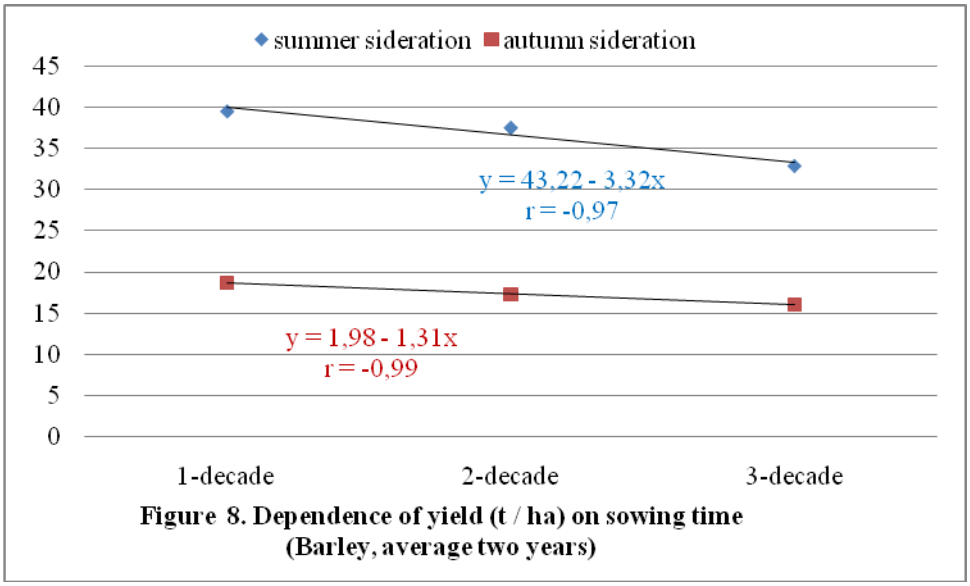


**Figure 8. Dependence of yield (t / ha) on sowing time (Barley, average two years)**

Thus, when green manure crops are sown in grain- free areas and cotton, the soil is enriched with large amounts of organic matter, and their decay improves the agrophysical and agrochemical properties of soil.

This ensures good growth of the crops which sown after them as well as resulting in high and quality yields.

## CONCLUSION

In the experiment, the highest green biomass yield was 14.54-52.92 t/ha when peas, chick peas, rapeseed and barley were sown as green manure in the summer (July 10) grain-free areas, the relative green biomass yield was observed on July 20 and the green biomass yield was 14.10-50.73 t/ha.

In autumn (October 10), high biomass yields were observed when peas, chick peas, rapeseed and barley were sown as green manure in the fields between the rows of cotton which amounted to 6.44-22.41 t/ha followed by October 20.

2. The green biomass yield was 6.04-21.91t/ha when sown on October 10 the green biomass yield in peas variant was 0.40-0.77 t/ha, in chick peas was 0.34-1.02 t/ha, in rapeseed it was 0.5-2.78 t/ha compared to the variants planted on October 20 and 30, the barley was 1.35-2.62 t/ha more

3. In the conditions of meadow-gray soils of Samarkand region for green manure purposes in the grain -free summer and autumn cotton areas:

Sowing peas,hay, rapeseed and barley in the summer fallow lands no later than July 10 for the purpose of green manure;

in autumn between rows of cotton or cotton free areas no later than october10 and 20;

In order to maintain and increase soil fertility and to obtain high and high-quality yields from cotton, the grown green biomass is fertilized with green manure (siderate) in autumn (peas and chick peas flowering, rapa flowering and barley flowering) and early. in the spring (late March to early April, in the above phases) it is recommended to grind and drive under the plow.

It is recommended to be breakup and to plow into the ground and grow green biomass as fertilizer of the green manure (sideration) in autumn (during the flowering and fruiting phase of peas and chick peas, rape flowering and barley flowering) and early spring.(late March to early April, in the above phases) in order to maintain and increase soil fertility and obtain high and high-quality yields of cotton.

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