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Applying the movement of seeds on the surface of the working body and establishing the axis of the dividing plane of the electromechanical sorting device

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Abstract: This article is based on the coordinates of the angle of disconnection of seeds from the working body of an electromechanical sorting device and the axis of the dividing plane of the receiving bunker, which is based on the sorting of seeds of agricultural crops by the action of an electric field.

Keywords: sorting device, electric field, electrodes, voltage, planting seeds, technical fraction

Elektromexanik saralagich qurilmasining bo‘lish tekisligi o‘qini asoslash va urug‘larni ish organi yuzasidagi harakatini tatbiq etish

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Annotatsiya: Ushbu maqolada qishloq xo‘jalik ekinlari urug‘ini elektr maydon ta’sir ettirilib saralashga asoslangan elektromexanik saralagich qurilmasining ish organidan urug‘larni uzilish burchaklari va qabul qilish bunkerining bo‘lish tekisligi o‘qining koordinatalari asoslangan.

Kalit so‘zlar: saralash qurilmasi, elektr maydon, elektrodlar, kuchlanish, urug‘lik chigit, urug‘lik fraksiya, texnik fraksiya

1. Kirish

Qishloq xo‘jalik ekinlari urug‘larini saralash sifatini oshirish uchun amalda turli usullardan foydalanib kelinmoqda. Bu usullar ichida elektr maydon ta’sir ettirilib saralashni ham samarali deb aytish mumkin. Keyingi yillarda olib borilgan ilmiy tadqiqotlarning ko‘rsatishicha, aynan chigitlarning elektrofizik xossalaridan kelib chiqib ularga elektr maydoni yordamida ishlov berish yangi prinsipga asoslangan, yuqori samaradorlikka ega saralash, tabaqalash, zararsizlantirish texnologiyalarini yaratish imkonini berishi mumkinligini ko‘rsatmoqda. Shuningdek, olib borilgan tadqiqotlar dalada terib olingan dastlabki paxta xom ashyosini elektr maydonida saralash orqali bir vaqtning o‘zida undan olinadigan urug‘lik chigitning va qimmatbaho paxta tolasining sifatini yaxshilash mumkinligini ko‘rsatadi [1]. Qarama-qarshi ishorali elektrodlar orasida ma’lum bir masofa bo‘lishi kerak. Bu o‘z navbatida ish organi dielektrik qismining yuzasiga vintsimon shaklda yo‘nilgan ariqchalar orasidagi masofaga to‘g‘ridan-to‘g‘ri bog‘liq [2]. Shuni hisobga olib, Qishloq xo‘jaligini mexanizatsiyalash ilmiy-tadqiqot institutida tuksiz chigitlarni saralaydigan elektromexanik saralash qurilmasi tajriba nusxasi ish organida elektrodlar orasidagi masofani aniqlash uchun dielektrik halqalar yuzasiga yo‘nilgan ariqchalarini turli kenglikda tayyorlab, tajribalar o‘tkazildi [3].

2. Tadqiqot metodikasi

Ma’lumki, urug‘larni ish organi yuzasidan uzilish burchaklari elektr saralagich qurilmasining konstruktiv o‘lchamlari va ish rejimlari o‘zgarmas bo‘lganda, ularning fizik-mexanik xossalariga (massasi, geometrik o‘lchamlari, zichligi va energiya ko‘rsatkichi) bog‘liq bo‘lib, saralash texnologik jarayonida ish organi yuzasidan har xil burchaklarga burilganda uziladi [4]. Shuni hisobga olib, elektromexanik saralagich qurilmasida saralangan urug‘larni alohida-alohida, ya’ni urug‘lik va texnik fraksiyaga ajratish uchun qabul qilish bunkerini bo‘lish tekisligi o‘qining koordinatalarini to‘g‘ri tanlash lozim [5].

Tajribalar davomida avval bajarilgan tadqiqot ishlari tahlil qilinib, ish organi yuzasiga “γ” burchak ostida yo‘nilgan ariqchalarga 16, 13 va 10 mm li kenglikda, diametri 7 va 5 mm bo‘lgan elektrod sim o‘ralib, urug‘lar elektr saralagich qurilmasidan o‘tkazildi. Elektr saralagich qurilmasi ish organi aylanishlar soni elektron taxometr yordamida o‘lchanganda 20, 30 hamda 40 ayl·min, 3000 V,

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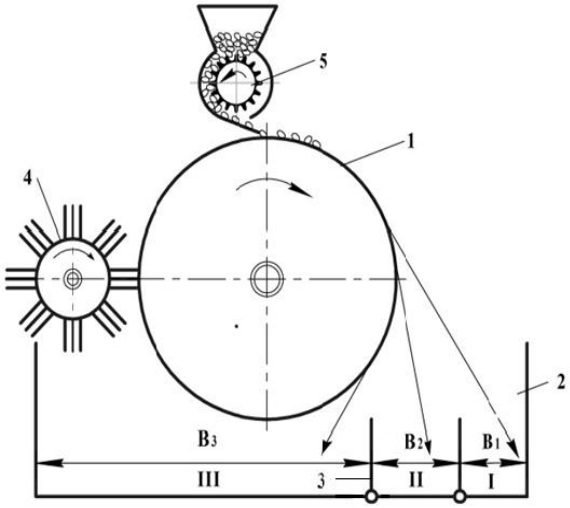
4000 V hamda 5000 V kuchlanish berilganda urug‘larning ish organi yuzasidan uzilish burchaklari o‘zgarishi kuzatildi. Qabul qilish bunkerining mos fraksiyalariga ajralgan urug‘lar miqdori aniqlanib, olingan eksperimental tadqiqot natijalari kompyuter dasturlari va differensial bog‘lanishli matematik ifodalar yordamida tahlillar o‘tkazildi.

1-rasmda ish organi diametri 340 mm, aylanishlar soni 40 min^{-1}, qarama-qarshi elektrodlar orasidagi kuchlanish 4000 V ga teng bo‘lganda, massasi har xil, ya’ni 40-65, 80-110, 120-140 mg ga teng bo‘lgan tuksiz chigitlarni elektromexanik saralagich qurilmasining ish organi yuzasidan uzilish burchaklarini o‘zgarish chegaralari tasvirlangan.



1-rasm. Har xil massali tuksiz chigitlarni ish organi yuzasidan uzilish burchaklarining o‘zgarish chegaralari:

1−ish organi; 2−qabul qilish bunkeri; 3−bo‘lish tekisligi; 4−cho‘tka; 5− yuklash bunkeri. B_3) 40 - 60 mg; B_2) 80 - 110 mg; B_1) 120 - 140 mg massali ajralgan urug‘lar

Rasmda tasvirlangan sxemadan ko‘rinib turibdiki, tuksiz chigitlar massasiga bog‘liq ravishda ish organi yuzasidan har xil burchaklarda uzilayapti. Bu o‘z navbatida qabul qilish bunkerini bo‘lish tekisligi o‘qining koordinatalarini to‘g‘ri tanlash orqali, ish organi yuzasidan har xil burchaklarda uzilgan tuksiz chigitlarni urug‘lik va texnik fraksiyalarga aniq ajratish imkonini beradi.

3. Tadqiqot natijalari

Qabul qilish bunkerining bo‘lish tekisligi o‘qi maqbul qiymatga erishguncha tajribalar davom ettirilib, olingan natijalar o‘zaro taqqoslandi. Qabul qilish bunkerining mos fraksiyalariga qancha miqdorda urug‘lar ajralgani elektron analitik tarozi yordamida o‘lchab olindi. Bo‘lish tekisligi ish organi valining markaziga nisbatan gorizontal tekislikda 170 mm masofaga o‘rnatilganda, fraksiyaga kelib tushgan urug‘lar asosan birinchi fraksiyaga ko‘p miqdorda ajraldi, ya’ni massasi bo‘yicha og‘ir urug‘lar miqdori ikkinchi fraksiyaga qaraganda ikki baravar ko‘p bo‘ldi. Uchinchi fraksiyaga esa deyarli tushmadi.

Qabul qilish bunkerining ish organi valining markaziga nisbatan gorizontal tekislikda 270 mm masofaga o‘zgartirilganda esa, fraksiyaga kelib tushgan urug‘lar asosan uchinchi (texnik) fraksiyaga ko‘p miqdorda ajraldi, ya’ni massasi bo‘yicha urug‘lik chigit hisoblangan urug‘lar ham texnik fraksiyaga tushib qoldi. Bu qiymat ikkinchi fraksiyaga qaraganda ikki baravar ko‘p bo‘ldi. Birinchi fraksiyaga esa deyarli tushmadi.

Bundan xulosa qilish mumkinki, qabul qilish bunkerini bo‘lish tekisligi o‘qining koordinatalari ish organi valining markaziga nisbatan gorizontal tekislikda 220 mm ga teng bo‘lganda elektromexanik saralagich qurilmasida tuksiz chigitlarni urug‘lik va texnik fraksiyaga aniq ajratishga erishiladi.

Ilmiy manbalardan ma’lumki, qishloq xo‘jalik ekinlari urug‘larini saralash qurilmasining yuklash bunkeri sirpanish taxtasidan aylanayotgan baraban yuzasiga kelib tushganda, ularning o‘zaro ta’siri natijasida uch xil harakat kuzatiladi: urug‘ barabandan sirpanib orqada qolib harakatlanadi ($V_u<V_b$); urug‘ baraban bilan birgalikda harakatlanadi ($V_u=V_b$) va urug‘ barabandan sirpanib ilgarilab harakatlanadi ($V_u>V_b$).

Jadvalda ishqalanish burchagi bir xil, massasi har xil bo‘lgan tuksiz chigitlarni elektromexanik saralagich qurilmasining ish organi yuzasidagi harakatini keltirib chiqarilgan matematik ifodalar bo‘yicha tadqiq etish natijalari keltirilgan.

1-jadval

Har xil massali tuksiz chigitlarni ish organi yuzasidagi harakatini nazariy tadqiq etish natijalari

Urug‘lik chigit massasi m, mg	**40-65**	**80-110**	**120-140**
Yig‘indi elektr maydon kuchining qiymati, ΣF, N	$569 \cdot 10^{-6}$		
Sirpanib orqada qolib harakatlanish burchagi α_2, gradus	15°30′-17°30′	18°30′-19°45′	20°30′-20°45′
Sirpanib ilgarilab harakatlanish boshlangan burchagi, α_3, gradus	56°49′-62°34′	58°40′-53°43′	51°41′-50°15′
Ish organi bilan birga harakatlanish burchagi, α_b, gradus	39°19′-47°04′	34°43′-38°30′	29°30′-31°41′
Ish organi yuzasidan uzilish burchagi, α_4, gradus	116°04′	88°30′	81°30′
Ish organidan uzilish vaqtdagi tezligi, V_u, m/s	1,48	1,26	0,99

Jadvalda keltirilgan natijalardan ko‘rinib turibdiki, tuksiz chigitlarni massasiga qarab, ularni saralagich qurilmasining ish organi yuzasidagi harakatining xarakteri ham o‘zgarayapti. Masalan, massasi 40-65 mg ga teng bo‘lgan tuksiz chigit tezligi ish organining chiziqli tezligiga 15°30′-17°30′ burchakka burilganda tenglashsa, massasi 80-110 mg va 120-140 mg ga teng bo‘lgan chigitlarni tezligi

ish organining chiziqli tezligiga, mos ravishda, 18°30′-19°45′ va 20°30′-20°45′ burchakka burilganda tenglashayapti. Ya'ni massasi kichik bo‘lgan tuksiz chigitlarni ish organi bilan birga harakati, massasi katta bo‘lgan chigitlarga nisbatan, oldinroq boshlanayapti. Shu bilan birga, massasi 40-65 mg ga teng bo‘lgan tuksiz chigitlar ish organi bilan 39°19′-47°04′ birgalikda harakatlanib, uning yuzasidan 116°04′ burchakka burilganda 1,48 m/s tezlik bilan uzilsa, massasi 80-110 mg va 120-140 mg ga teng bo‘lgan chigitlar ish organi bilan 34°43′-38°30′ va 29°30′-31°41′ birga harakatlanib, uning yuzasidan 88°30′ va 81°30′ burchakka burilganda, 1,26 va 0,99 m/s tezlik bilan uzilayapti.

Olingan natijalardan ko‘rinib turibdiki, massasi har xil bo‘lgan tuksiz chigitlarni saralagich qurilmasining ish organi yuzasidagi harakati bir-biridan tubdan farq qiladi. Shuning uchun ularni ish organining yuzasidan uzilish burchaklari ham farq qilib, har xil burchaklarda uzilayapti.

4. Xulosa

1. Elektromexanik saralagich qurilmasida elektrodlarga beriladigan kuchlanishning belgilangan qiymatini urug‘larni saralash texnologik jarayonini amalga oshirishda asosiy omillardan biri sifatida qarash mumkin.

2. Tuksiz chigitlarni fizik-mexanik xossalari bo‘yicha elektromexanik saralagich qurilmasining ish organi yuzasidagi harakati va uzilish burchaklarini bir-biridan farq qilishi, ularni urug‘lik va texnik fraksiyaga aniq ajratish hamda yuqori sifatli, biologik xossalari bir-biriga yaqin bo‘lgan sara urug‘liklar olish imkonini beradi.

3. Ish organi diametri 340 mm, aylanishlar soni 40 min^{-1}, qarama-qarshi ishorali elektrodlarga beriladigan kuchlanish qiymati 4000 V, elektrodlar diametri 5,0 mm va orasidagi masofa 10,0 mm ga teng bo‘lganda, sifatli tuksiz chigitlardan sifatsiz tuksiz chigitlarni ajratib olish ta'minlanadi.

4. Qabul qilish bunkerini bo‘lish tekisligi o‘qining koordinatalari ish organi valining markaziga nisbatan gorizontal tekislikda 220 mm va vertikal tekislikda 250 mm masofaga o‘rnatilib, balandligi 225 mm ga teng bo‘lganda elektromexanik saralagich qurilmasida tuksiz chigitlarni urug‘lik va texnik fraksiyaga aniq ajratishga erishiladi.

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