Growing corn

Full technology

Soil and climatic conditions

The growth and development of corn are most affected by heat and moisture, they are often the limiting factors in growing crops.

The optimum daytime temperature for growing corn is 24-30 ° C.

At night, the temperature should be about half lower, because on hot nights, corn significantly increases evaporation, which leads to a gradual decrease in dry weight. The threshold temperature for the growth and development of the crop is 10° C, if the temperature drops below this figure, corn almost stops growing.

Corn needs 450-600 mm of moisture during the growing season, and it needs the most precipitation in July-August. Unfortunately, the trends of recent years towards prolonged summer droughts show that it is usually useless to expect precipitation, and even in sufficient quantities, in July-August. Therefore, the accumulation of moisture in the soil, preservation and retention of already accumulated, as well as providing corn roots to improve access to moisture and reduce competition for it in the field - by optimally selected nutrition and tillage system, choice of plant density and good protection system .

Of course, in addition to heat and moisture, corn also needs fertile and well-structured soil, as well as sufficient nutrients. The crop can be grown on all types of soil, but experts do not recommend sowing it on sandy soils and fields where groundwater is close to the surface. Maize can give high yields on soils with a pH of 5.6 to 7.5. If the pH is below 5.6, the yield is significantly reduced, and at pH 4.0 corn plants have no chance of surviving. At high acidity of the soil the roots of plants become discolored, the lower part begins to rot.

Tillage for corn

Basic tillage

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The main tillage for corn is best done immediately after harvesting the predecessor. Optimally - in summer or early autumn. In wet and cold areas, especially in mountainous areas, on slopes or areas along rivers flooded in autumn and / or spring, autumn cultivation has no advantages over spring. However, there are few such territories in Ukraine. In any case, the earlier the main tillage, the better. And the specific term and method will already depend on the predecessor.

Disc harrow Kuhn Excelerator 8005

Classic technology

After cereals, the main tillage begins with peeling the stubble in one or two tracks immediately after harvest. Further tillage depends on the species composition of weeds: seedlings of annual weeds are destroyed by subsequent peeling, and in case of mass clogging with perennial root-sprout weeds (thistle, birch, milkweed, etc.) use shallow plowing to a depth of 12-16 cm multi-body plowshares , aggregated with ribbed rollers. In the absence of ribbed rollers behind the plow are disc cultivators, level the furrows and the surface plowed layer. Deep shelf plowing to a depth of 25-30 cm should be carried out in September-October immediately after fertilization. In drier unfavorable areas, on soils with low permeability plowing should be performed to a depth of 30-35 cm.

A variant of the above-described main tillage technology is the layer-by-layer tillage system, which is especially effective for reducing the population and suppressing weeds in fields infested with perennial root-sprouting weeds. This system includes 2-3 discing of the soil to a depth of 8-10 cm, then another - to a depth of 10-12 cm, 2-3 weeks after it peeling with heavy disc harrows and deep shelf plowing at 25-30 cm in late September- October. If the fields are heavily infested with weeds, it is advisable to carry out combined tillage, including mechanical and chemical destruction of perennial weeds.

If deep plowing is of poor quality (with large boulders, strongly pronounced ridges and furrows), it is necessary to level the soil in autumn (rough pre-sowing preparation) with the help of levelers at an angle of 45 ° to the direction of deep plowing. When clogging the fields with only annual weeds, the most effective improved chill, which includes 2-3 disc stubble peeling to a depth of 6-8, then 8-10 cm and plowing to a depth of 20-25 cm in September-October.

Soil-saving and energy-saving technologies

The emergence of new herbicides, new tillage equipment with improved characteristics and the use of seeds with high growth energy have made it possible to use minimal tillage systems. Such systems allow to reduce the number of equipment passes through the field, leave more plant residues on the soil surface, prevent soil erosion and save fuel.

In conditions of drought and lack of moisture, on sandy soils, the systems of minimum tillage (no-till, mini-till, strip-till) are able to provide decent yields and at the same time reduce energy and labor costs. However, for the application of such technologies, the farm must have appropriate equipment and plant protection systems, especially herbicides. In addition, such systems are unsuitable for maize-growing regions with more temperate climates, where crop residues remain moist for a long time and soil surfaces can delay sowing and inhibit the development of maize in the early stages of development because it is cold. In regions with a shortage of moisture, it will be advisable to use mulching or preserving technologies.

Mulching technology

It envisages replacement of deep tillage with surface-free tillage, destruction of weeds by the combined method (mechanical plus chemical) and formation of a layer of mulch from plant residues on the soil surface. This technology is used in the fall to stubble stubble, treat the field with herbicides (if it is littered with perennial weeds) and harrowing with compaction. In the spring, moisture closure and pre-sowing application of soil herbicide for cultivation with a notch to a depth of 6-8 cm.

Canning technology

- Provides for the preservation of some plant remains, replacement of deep tillage with surface-free tillage (deep tillage, deep flat-cut tillage). In general, it differs from mulching technology in that in autumn, instead of harrowing, deep tillage is carried out and only a certain part of plant residues is left on the surface (usually about 20-30%).

Vertical tillage

- This is a plowless technology, the feature of Verti-till is the absence of horizontal displacements of the soil during cultivation, the absence of inversion of the chips and compaction. There is also grinding and distribution of crop residues on the field surface. This technology involves annual surface tillage with vertical units, and every 4-6 years of cultivation with deep cultivators to a depth of at least 40 cm to effectively "break" the plow sole, which is usually formed at a depth of about 25 cm and extends to a depth of about 10- 12 cm.

Pre-sowing tillage

- The purpose of pre-sowing soil preparation in the spring is to provide a loose, sufficiently moist and warm surface layer, which allows you to sow quality corn and ensure rapid and friendly germination of seeds. In addition, soil preparation activates the viability of microorganisms and destroys weed seedlings.
- The task of pre-sowing soil preparation is to create a "hard bed" and at the same time "soft cover". That is, appropriate agricultural implements (air conditioners, cultivators, harrows) must provide shallow tillage to the depth of seed wrapping (4-6 cm), which forms a "soft cover" - a loose, warm surface layer of soil that prevents moisture loss from deeper layers. These works are performed at an angle of 45 ° in relation to the direction of deep plowing or other types of main tillage. Under the "soft cover" is a moist, firm bed, which contributes to the uniform wrapping of seeds to a given depth.

Corn seeds: choice of hybrids, seeding rates

- To get good crops and a quality harvest, you need first of all quality seeds. And although the tastes and preferences of many farmers have already developed, experienced agronomists advise not to focus only on those hybrids that are already well known and studied to the smallest detail. After all, the market today is so diverse that it would be a sin not to take advantage of all the opportunities offered.
- **Criteria for selecting corn seeds**
- So what criteria do experts advise to pay attention to when choosing corn seeds in the first place?
- **FAO**
- It so happened that the most popular are medium-ripe hybrids that have FAO 280-390. According to agronomists, these are "universal soldiers" who can be sown almost all over Ukraine and get a good harvest under any conditions. However, experts advise not to "put all the eggs in one basket." Early and late hybrids also deserve attention and respect. It is better to sow hybrids of all maturity groups in different proportions, according to the conditions of the farm and its plans. First, it will stretch the time of sowing and harvesting, which is always appropriate and convenient for the economy. Secondly, it will allow some diversification of the risks posed by unpredictable climatic conditions in recent years.

Yield potential

Agronomists first of all look at the yield and are interested in it, choosing a new hybrid. And they still advise to test hybrids in the field to see for yourself their advantages, possible disadvantages and basic properties.

Moisture removal

If the yield potential of the hybrid is very high, but "limping" moisture, you do not have to count on big profits. Therefore, rapid moisture release is one of the signs to which every agricultural producer pays attention.

Drought resistance

In conditions when the Ukrainian zone of sufficient moisture is gradually but surely becoming a zone of insufficient moisture, drought resistance is becoming an important feature.

Cold resistance

Frankly, many agronomists do not pay enough attention to cold resistance even now, when spring has already shown how unpredictable they can be. However, say experts in the seed business, this is a very useful and important feature that allows you to sow corn at an earlier date and reduce the impact of insurance herbicides used during the cold.

Stability

The stability of the result in any growing conditions is a very important feature, because capricious hybrids, which at the slightest stressful impact immediately lose significantly in yield, will not please agronomists.

Suitability for growing in monoculture

Very few farms today adhere to scientifically sound crop rotations. Therefore, growing corn in monoculture is quite common. Therefore, you need to choose seeds that are not afraid of that monoculture.

Choice of hybrids

Agro climatic conditions of Ukraine allow to grow different groups of maturity to rather late, but the main FAO which is grown up in Ukraine, is 240-370. That map of FAO, which was many years ago, is not relevant today, as there have been significant changes in the direction of increasing FAO. In the northern part of Ukraine, depending on soil conditions, LG30215 and LG30273 will be good choices. Hybrids have a high tolerance to smut and fusarium wilt and good moisture and cold resistance. The central part of the corn belt is quite interesting. FAO is grown here from 250 to 350. Tooth hybrids should not be sown in the early stages of sowing.

For each farm it is recommended to have different maturity groups, which allows the pain to stably and confidently get the average result on the farm, thus avoiding adverse factors in the critical phases for corn. In addition, it will allow timely agro-technological operations, as it is almost impossible to carry out field work, protection and harvesting in all fields at the same time, and untimely application of herbicide has a negative impact on the result. . For example, quite often Adeway is sown with hybrids of late maturity and decide on the development phase for herbicide application on late hybrids, and Adeway has a high initial dew energy and as a result we get suppression of plants, which leads to loss of yield.

In view of all this, it is proposed to use different FAO groups, namely 200-250 in the amount of 10-20% depending on the climatic zone, 260-300 in the amount of 30-40% and the rest in the FAO after 300. If you take in terms of hybrids, for example in the central part of Ukraine, it is worth using hybrids LG30273, Adevey and LG31377, further south you can consider the scheme LG30254, Adeway or LG30315 and LG31388. One way or another, each individual farm has its own characteristics and requirements, so it needs an individual approach.

Corn seeding rates

In determining the seeding rate of maize seeds, in addition to the laboratory germination of seeds, a number of factors must be taken into account that affect field germination and the risks of reducing the number of plants during the growing season before harvest. Field germination is mainly influenced by the quality of seeds and the quality of soil preparation (its structure, as far as it ensures contact of seeds with soil) and moisture reserves in it. In addition, some plants are lost during the growing season, mainly in the early stages of development, in particular damaged by pests that gnaw the root system or "bite" young seedlings.

The seeding rate of maize shall be determined taking into account the above and shall ensure the pre-harvest density. To achieve the density of standing plants at the time of harvest set insurance premiums. They can be 5-20%.

Sowing corn

Quality sowing is a key factor in obtaining high yields of corn. In this regard, special attention should be paid to the adjustment of the drill, the correct depth of seed wrapping, uniformity of seed placement in a row, to prevent two or more seeds from falling into one hole.

In these cases, the use of starting fertilizers gives increased yields, reduced grain moisture during harvesting, as well as rapid uniform growth in the initial period of development. Thus, the cultivated plant quickly shades the aisles and thus reduces the chances of weeds in the fight for nutrients in the later period of development. Plants develop a better root system and usually have earlier flowering, which reduces the effects of drought stress on the process of pollination and grain filling.

Terms of sowing

Experts recommend sowing corn as early as possible today. However, farms sometimes disregard this recommendation for fear of getting fast and even seedlings, for saving on early herbicide protection, or for having failed early sowing experiences in the past. Corn does not grow at temperatures of 10 ° C and below, even at 13 ° C seedlings will have to wait a long time, but at 15-16 ° C seedlings will be friendly and plants will appear on the soil surface in 7-10 days after sowing .

Technique for sowing and depth of seed wrapping

You can use any precision seeder available on the farm to sow corn. It is only important that the drill is set up correctly, you can not waste time. The drill should be set up to ensure uniform planting of single seeds to a given depth, which guarantees uniform germination and the desired plant density per hectare and, ultimately, largely determines the yield. Care must also be taken to ensure that the seeding speed does not exceed 5-6 km / h. and sowing was carried out at an angle of 90 ° to the direction of plowing. It is necessary to control the quality of sowing by opening the row and check the depth and uniformity of seed decomposition in the row. Another important point: it is necessary that the rolling wheel compacts the soil well in a row. Experts do not recommend mowing and harrowing crops unless it is caused by extreme weather or economic conditions.

For optimal conditions (heat, moist soil) the ideal depth of seed wrapping is 5 cm. With very early sowing and sufficient moisture in the soil, the wrapping depth should be reduced by 1-2 cm, assuming that the soil warms up faster. If the soil is dry, it should be sown so that the seeds come into contact with a moist layer of soil, even if it is necessary to deepen it by 8-10 cm.

Corn is a very productive crop, which in the climatic conditions of Ukraine is able to form a yield of 8 and more t / ha. Maize responds well to prolonged fertilizers applied in autumn or early spring, such as urea, anhydrous ammonia, but when used in pre-sowing cultivation or when sowing fertilizers with nitrate form in the norm up to 15% of the total need, such fertilizer is YaraBela Sulfan at the rate of 100-120 kg / ha (pre-sowing cultivation) or YaraMila 16: 27: 7 at the rate of 100-120 kg / ha (at sowing). A fairly good fertilizer for use in the spring is CAS, which contains all three forms of nitrogen in a ratio of 50% amide, 25% ammonium and 25% nitrate. This makes it possible to combine prolonged and rapid forms of nitrogen in one application. The next important nutrients for corn are phosphorus and potassium. Feeding on these elements should be carried out according to the results of soil analysis, taking into account the removal of grain products, which is 50 kg / ha of phosphorus and 36 kg / ha of potassium per 8 t / ha of corn, and total plant consumption of these elements, 74 kg / ha of phosphorus and 196 kg / ha of potassium for the above yield. It is desirable to separate the main nutrition, which is carried out to maintain soil fertility, mostly in the fall under the main tillage, and the starting, which is desirable when sowing in the root zone with high quality and highly soluble fertilizers, such as YaraMila. Under conditions of high background nutrition with nitrogen, phosphorus and potassium fertilizers, the yield of intensive maize hybrids largely depends on foliar nutrition. A significant number of enzymatic reactions in the plant takes place only in the presence of trace elements such as zinc, manganese, copper and iron. The introduction of these trace elements is desirable in the phase of 3 to 7 leaves on corn.

Protection of corn crops

When applying the classic technology of tillage for corn, it is necessary to strive to ensure that the maximum possible number of weeds was destroyed mechanically during the main and pre-sowing soil preparation. According to practical research, in areas plowed in autumn, with open furrows during the frosty winter, 12 weeds germinate per square meter in spring. And in areas that were leveled in the fall after deep plowing, seedlings were found on average 114 weeds per square meter.

From the moment of emergence and clear manifestation of rows, it is possible to carry out inter-row cultivation in order to control weeds and crusts on the soil surface. The crust causes the most damage if it is formed before germination. If it is so strong that it does not allow the corn ladder to break through it, it is necessary to roll with toothed rollers, and the speed of the unit should not exceed 4 km / h.

Inter-row tillage is performed as needed, usually double loosening between rows with simultaneous feeding or inter-row loosening and hilling with simultaneous feeding. The first cultivation is carried out in the phase of 3-4 leaves to a depth of 7-8 cm, and the second, less in-depth, in the phase of 7-9 leaves.

You should try to combine several operations in one pass, because each pass is an additional cost

Application of herbicides on corn

The basis for deciding on weed control in crops is the species composition and dynamics of weed emergence in the pre- and post-sowing periods. Depending on the soil-climatic zone in which the crop is grown, the species composition of weeds in the fields differs. The number of species composition of weeds in crops can vary from 10 to 15 species. This amount is enough to significantly reduce crop productivity. The strategy of combining pre- and post-emergence treatments justifies itself and provides a high level of weed control when applied to fields with mixed weed species composition, in particular dicotyledonous and monocotyledonous. However, it should be remembered that in some cases the soil herbicide will not work: Application of the soil herbicide after the early sowing of the crop, when the seedlings emerge late, while the herbicide expires.

Errors in calculating the required norms and type of soil herbicide depending on: soil type (for example, clay "absorbs" part of the active substance), high weediness of the field and species composition of weeds.

Poor application (high pressure in the sprayer system, poor quality nozzles, small amount of working solution).

- Incorrectly selected water for spraying, or not properly prepared (pH, hardness, turbidity, temperature, etc.).
- The presence of a large number of plant remains in the field.
- Poor soil preparation, large lumps, uneven field.
- The onset of frost or late frosts.
- Washing of the active substance after heavy rains or showers in the lower soil layers.
- Finally, the most common cause is insufficiently moistened surface layer of the soil, which does not allow the active ingredient of the herbicide to bind.

Disease control and fungicidal protection of corn

The approach to corn disease control must be comprehensive to achieve maximum results. And protection against disease begins long before sowing even took place.

Ideally, it will contain the following series of measures: Crop rotation: it is desirable to return corn to the field only in the 4th year. If this is not possible for economic reasons, more reliable chemical protection should be provided.

Management of plant residues.

Use of quality seed disinfectants. Fungicide-insecticide pesticides will protect against seed infection, seedling damage, as well as protect seedlings from pest damage and, consequently, from creating favorable conditions for soil infections.

Timely application of insecticides to protect corn from pest damage and, consequently, disease damage due to damage.

Use systemic fungicides in the phase up to 10 leaves of the culture to protect crops from fusarium wilt and some other infections.

Regular field monitoring for early detection of smut plants.

Selection of quality seeds from proven producers and suppliers to eliminate the possibility of bacterial infection.

Recommendations of the company's experts to protect corn crops

There are several aspects to consider from the corn stalk butterfly and the adult diabrotica: Monitoring the emergence and development of both types of pests (pheromone traps, light traps) is a mandatory element of control.

It should be understood that the appearance of pests is different in time (it all depends on weather conditions, time of sowing corn).

Mass egg-laying of the corn borer pest lasts up to 10 days, which is the most dangerous period for its spread. Adult diabetes can appear for quite a long period of time. Accordingly, the egg-laying of the pest is stretched in time.

If an insecticide is used once to protect against the stem butterfly, there may be several sprays from the adult diabrotica.

Insecticide spraying occurs during high temperatures, so the choice should take into account the properties of insecticides, as well as objects: stem butterfly - spraying during mass egg-laying by the pest (ie stage of the pest egg, larva). Diabrotica - spraying in fact with the mass appearance of the adult pest (EPS 1.5 copies / plant)

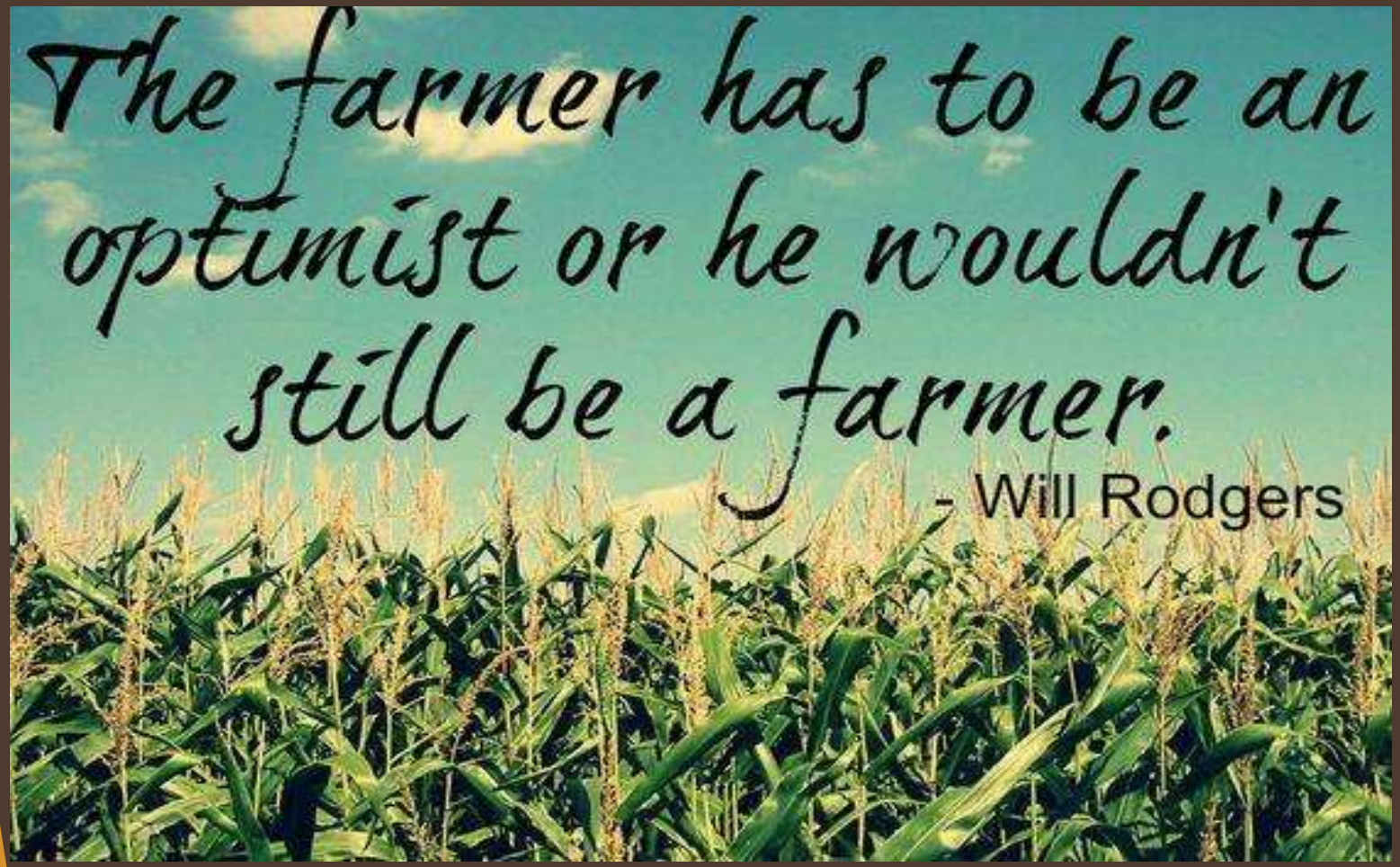
The most harmful to corn is the larva of diabrotica, not the imago, which will appear next year if the corn is in monoculture. Therefore, adult insecticide control and crop rotation can be a method of pest control in next year's maize crops.

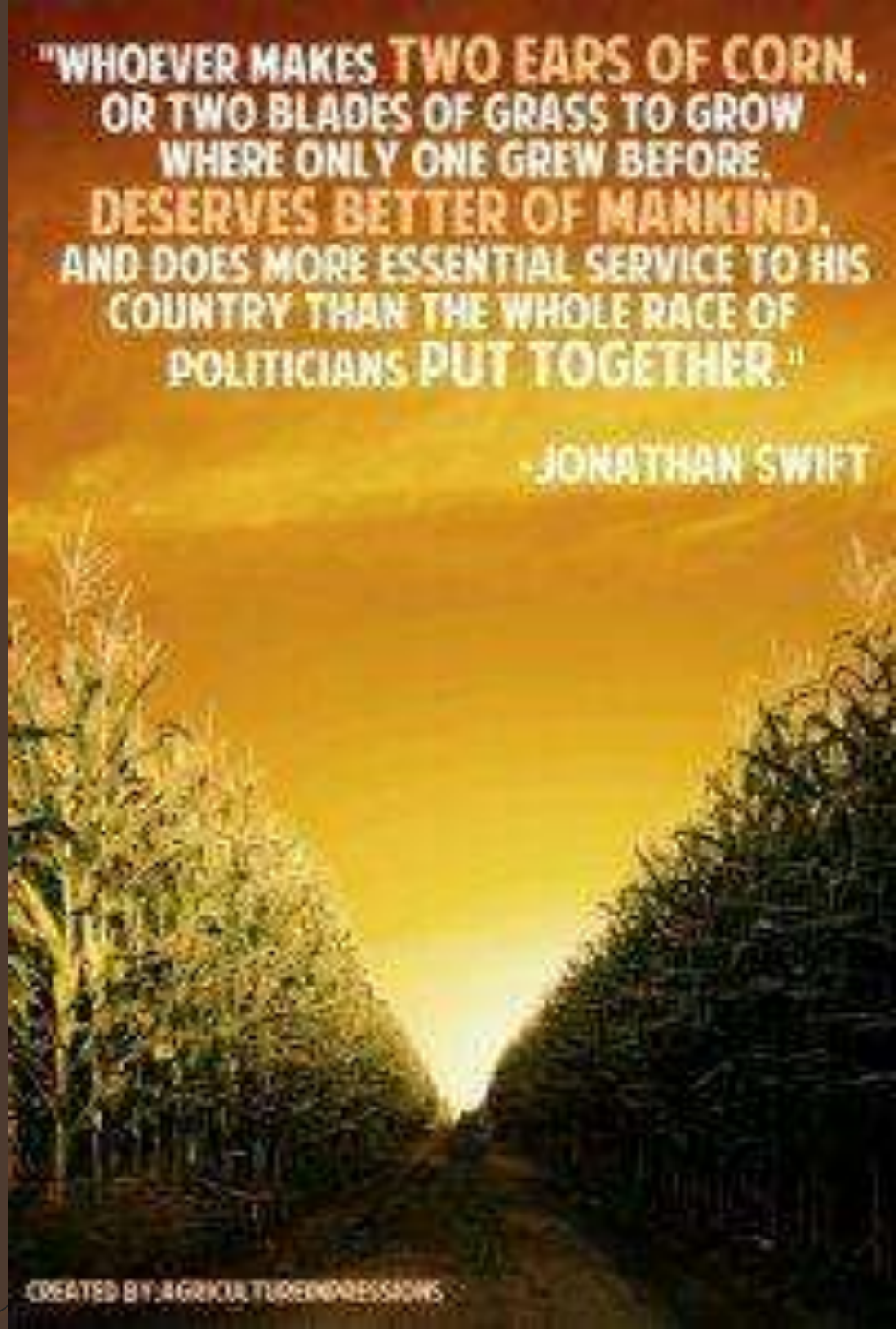
Harvesting corn

The main method of harvesting marketable corn is combine threshing of cobs, which can be started at a humidity of 30-32%. This method is more expedient than harvesting in cobs, as labor costs are reduced by about half and fuel costs are reduced by 20-25%. Seed corn is harvested only in cobs, followed by their obligatory thermal drying in specialized dryers.

Harvesting with lower humidity reduces drying volumes and reduces fuel consumption (liquid) by approximately 7-8.5 kg per planned ton (humidity reduction by 6%). However, a long delay in harvesting is risky, as it slows down the moisture release of grain, it is possible even to moisten it due to precipitation. Freezing corn is also undesirable, as it impairs the quality and stability of the grain during storage.

When growing hybrids of different maturity groups, harvesting should start with early or middle-early, so that later they reduce the moisture content of the grain.


The farmer has to be an optimist or he wouldn't still be a farmer.
- Will Rodgers


"WHOEVER MAKES TWO EARS OF CORN,
OR TWO BLADES OF GRASS TO GROW
WHERE ONLY ONE GREW BEFORE,
DESERVES BETTER OF MANKIND,
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COUNTRY THAN THE WHOLE RACE OF
POLITICIANS PUT TOGETHER."
-JONATHAN SWIFT
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