Volume 3 - Issue 8– August,2023

SABUJEEMA

An International Multidisciplinary e-Magazine

ORGANIC FARMING ON PERENNIAL FODDERS(LEGUMES)-A WAY FOR ECOLOGICAL BALANCE

[Article ID: SIMM0281]

Sophia Swain

AAO, Tirtol, JAGATSINGHPUR, GOVT.OF ODISHA

Abstract

Due to the deepening ecological crisis, there is a steady trend of increasing demand for food organic production of agricultural products. Organic grassland farming is not only a set of measures aimed at obtaining environmentally safe forage. Organic grassland farming is closely integrated into the context of sustainable development and environmental management. It also includes a set of measures to preserve the environment, where a huge environmental and stabilizing role in agro landscapes meadows, protecting the soil from erosion and sources from siltation and pollution .It is the reduction of ploughed land, the reproduction of meadows and a network of sanctuaries, nature reserves, hunting grounds, along with an increase in the production of organic fodder, helps to improve the ecological balance of the environment, the conservation of biodiversity of plants, animals, in particular species included in the Red Book .

INTRODUCTION: -

Natural forage lands in the vast majority as an ecologically clean area and a source of environmentally safe forage is an important component of ecological tourism, in combination with organic production meets the requirements of sustainable development and rational nature management. In line with the development of the tourism industry it is necessary to design and implement a program for the development of ecological tourism, and in particular agritourism, in which considerable attention is paid to the quality of food as an important element of the quality of service.

An integral component of organic production is the development and implementation of a set of measures aimed at the conservation of flora and fauna of the perennial legume fodders by creating a network of nature reserves, wildlife refuges, hunting and deer farms with keeping and grazing animals in cages. In organic fodder production great attention should be paid to quality control of fodder by certified laboratories. Fodder should meet the requirements of state standards of Ukraine, where control is provided not only on the main indicators of quality, but also on safety indicators.

In recent years, due to the increasing processes of climate aridization and xerophytization of vegetation to ensure sustainable development there is a need to search and introduce drought-resistant species from the group of mesoxerophytes and xeromesophytes in the Forest-steppe and even Polesie for stable organic fodder production should be introduced drought resistant species of fodder plants or irrigation .Organic feed production combined with the corresponding direction of livestock, is an inseparable link between crop and livestock production and an important element of organic production in general. For Ukraine,

the development of organic feed production should go hand in hand with the development of cattle breeding and livestock and increase the number of cattle and not only the dairy, but the meat direction. Livestock provides an opportunity to obtain organic fertilizers, which are the source of receipt of nutrients in the soil for organic production. Optimal load per 1 hectare of forage land to bring up to 1.5 cattle or 15 sheep, which will produce and introduce 10 tons of organic matter into the soil, which will ensure high and sufficient yields not only crops of forage group, but also the other crops.

PERENNIAL FODDER LEGUMES

The herbaceous plants cultivated for livestock feed that have a life span of more than one year are called perennial fodders.

The yearly life cycle of these grasses consists of the following phases: spring sprouting, tillering, heading, flowering, fruiting with repeated tillering, autumn vegetation, and winter dormancy. Economically the most important and most present perennial fodder legumes are alfalfa (*Medicago sativa L.)*, red clover (*Trifolium pratense L.*), bird's foot trefoil (*Lotus corniculatus L.*) and white clover (*Trifolium repens L.*), although in the last decade sainfoin (*Onobrychis viciifolia L.*) and Swedish clover (*Trifolium hybridum L.*) became very important. Their economic significance is based on high potential for production of biomass (over 80 t ha-1 of green and close to 20 t ha-1 of dry matter) with high content of crude protein in biomass. Depending on the species and exploitation stage, content of crude protein is up to 24%, whereas the yield of protein can be over 3.5 t $ha^{-1.}$ Biomass is characterized with high content of macro and micro elements which can compensate their shortage in other species grown in the mixture. Therefore, presence of perennial legumes in nutrition of domestic animals can considerably reduce, and in some cases even completely exclude, the use of concentrated protein feeds. Process of biological nitrogen fixation gives to perennial legumes, not only from the economical, but also ecological aspect high significance and unavoidable role in sustainable and organic agricultural production. The level of biological nitrogen fixation is under significant influence of genotype, strain of bacteria – nitrogen fixator and factors of the environment. Correct choice of species regarding altitude, edaphic and climatic conditions, and their combination with perennial grasses it is possible to provide high quality fodder for livestock nutrition.

Alfalfa is mainly grown in low land regions on soils of neutral to slight acid reaction, red clover can be grown in hilly-mountainous regions on soils of poorer quality and slightly higher acidity. Bird's foot trefoil can be grown in pure crop or mixture with perennial grasses, even on very acid soils. Perennial grasses include all species widely spread, adaptable to different agro-ecological conditions which significantly increase their importance from the aspect of agronomy, especially on natural or artificial grasslands on higher altitudes. Numerous species of perennial grasses are cenobionts, i.e. builders of numerous natural plant associations of natural grasslands which take vast areas .Perennial grasses represent basis of sustainable livestock production, as main feed for ruminants in the regions of moderate climate as component of natural or artificial/sown pastures , natural and artificial/sown meadows which can be exploited either by cutting or for preparation of haylage and silage .By rational management of perennial grass crops low prices of fodder livestock feed are achieved,

considerably lower than concentrated feeds. The most important species for livestock nutrition are cock's foot (*Dactylis glomerata* L.), English ryegrass (*Lolium perenne* L.), meadow fescue (*Festuca pratensis Huds*.), tall fescue (*Festuca arundinacea Schreb*.), Timothy grass (*Phleum pratense L*.), Italian ryegrass (*Lolium multiflorum Lam*.), French ryegrass (*Arrhenatherum elatius* (L., P. Beauv. ex J. Presl&C.Presl.), red fescue (*Festuca rubra L*.) and smooth brome (*Bromus inermis Leyss*).

LUCERNE

STYLO

ORGANIC FODDER PRODUCTION

In organic crop farms, growing crop yields are limited by insufficient nitrogen supply to plants and crop weediness. In such farms, legume swards are proposed as a service crop to improve nitrogen cycling. However, a positive effect of nitrogen is not only on cereals but also on weeds. In crop rotation, legume swards can stimulate the competition of cereals using the above-ground mass of legume to control the spread of weeds.

The effectiveness of the perennial forage legumes is determined by the uses of the above-ground mass: soil cover, mulching, application of green manure, and intensity of mass mineralization. Type of activity of forage legumes on weeds were competition for environmental resources, disruption/promotion of germination, destruction of above-ground mass, reduction of the number of matured seeds, creation of a physical barrier (mulch), and increase of competitiveness of cereals. Growing forage legumes in pure crops usually leads to a loss of marketable production

Animal husbandry fulfils a central role in organic farming. Most of the organic farms practice animal husbandry. In bio-dynamic farming, the keeping of ruminants is obligatory. Alongside the production of food, animal raw-materials, and immaterial services (services delivered by animals), the services of animal husbandry delivered within a farm are especially of great importance for organic farming Animal husbandry makes use of the growth produced by green manure cultures on fields, makes use of crop by-products and produces manure as an important fertilizer. Therefore, it is an integral part of the cycle of organic management.

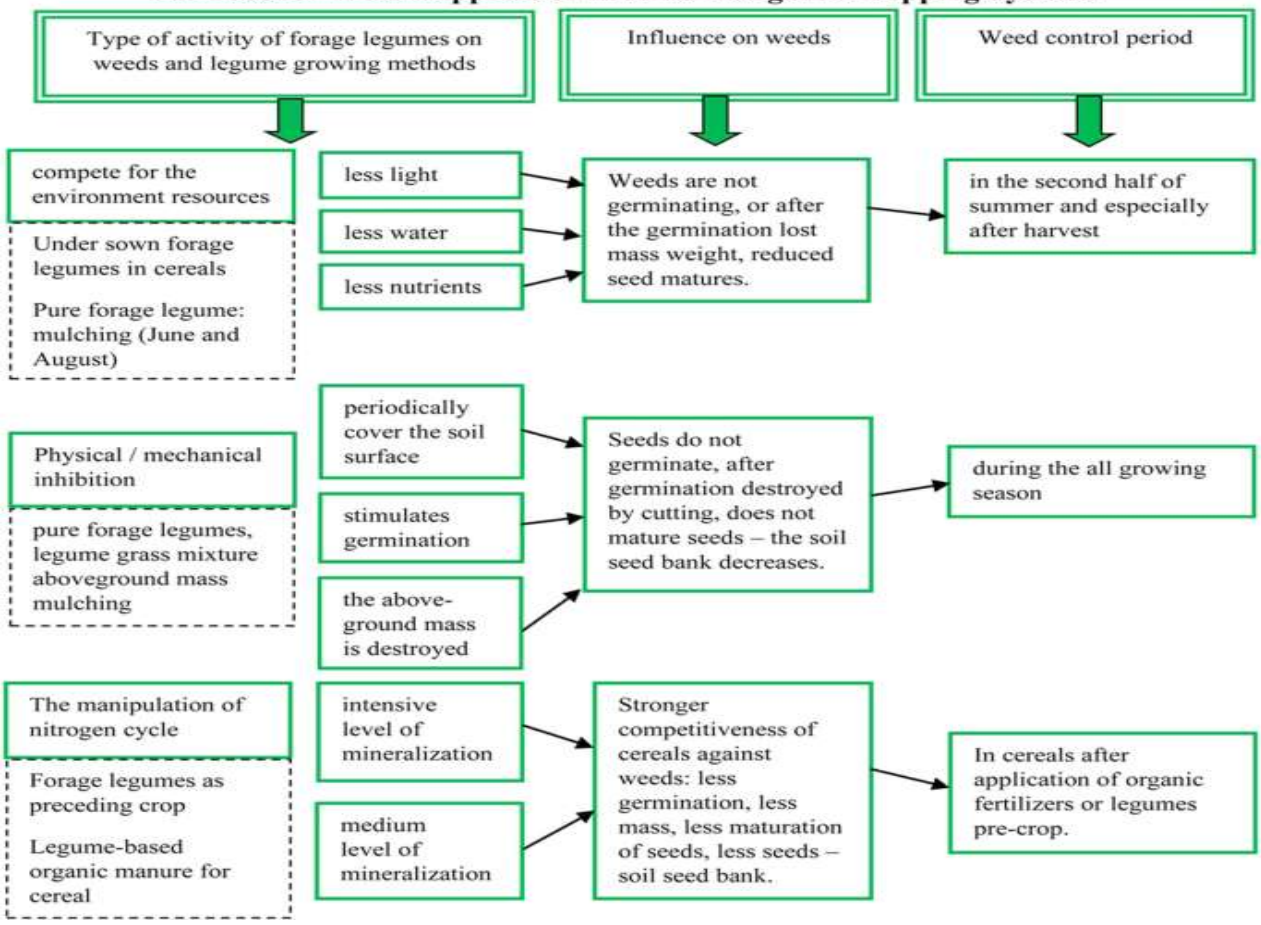
PERENNIAL FORAGE LEGUMES FOR NITROGEN FIXATION

Nitrogen acquisition is one of the most important factors for plant production, and N contribution from biological N2 fixation can reduce the need for industrial N fertilizers. Perennial forages are widespread in temperate and boreal areas, where much of the agriculture is based on livestock production. Due to the symbiosis with N2-fixing rhizobia, perennial forage legumes have great potential to increase sustainability in such grassland farming systems. The present work is a summary of many studies investigating N2 fixation in three perennial forage legumes primarily relating to ungrazed northern temperate/boreal areas. Reported rates of N2 fixation in above-ground plant tissues were in the range of up to 373 kg N ha-1 year-1 in red clover (Trifolium pratense L.), 545 kg N ha-1 year-1 in white clover (T. repens L.) and 350 kg N ha-1 year-1 in alfalfa (Medicago sativa L.).

When grown in mixtures with grasses, these species took a large fraction of their nitrogen from N2 fixation (average around 80%), regardless of management, dry matter yield and location. There was a large variation in N2 fixation data and part of this variation was ascribed to differences in plant production between years. Studies with experiments at more than one site showed that also geographic location was an important source of variation. On the other hand, when all data were plotted against latitude, there was no simple correlation. Climatic conditions seem therefore to give as high N2 fixation per ha and year in northern areas (around 60°N) as in areas with a milder climate (around 40°N). 60°N) as in areas a milder (around40°N).

PERENNIAL FODDER LEGUMES ON WEED SUPRESSION

Perennial Forage Legume Cultivation and Their Above-ground Mass Management Methods for Weed Suppression in Arable Organic Cropping Systems



CHALLENGES OF INDIAN ORGANIC FARMING IN PERENNIAL FODDER LEGUMES

Organic farming in the Indian context must resolve several issues at both micro and macro level.

Micro level issues: The micro level issues confronting organic farming include economic viability, particularly for small and marginal farmers, marketing, etc. For example, one of the greatest barriers for organic farming is the so-called conversion period due to the direct and indirect costs. The conversion of a conventional farm to an organic farm requires strictly adhering the rules and standards of production, processing and labelling at prescribed international levels. During the conversion period all the standards required for certifying a product as 'organic' must be fulfilled and verified by a

certifying agency. Costs due to things, such as information, marketing charges, inspection, and certification expenses also increase the cost of organic farming. For instance, fees for the inspection and certification can be prohibitively high at Rs. 5000, since this equals the returns from agriculture for many small farmers. The often-reduced yields of organic farming, as compared to conventional farming particularly during the conversion period before soil nutrients and organic matter are replenished with bio-fertilizers, are an additional liability to the farmer. Particularly during the conversion period when the products are not certified as organic, and thus, they cannot be sold at the organic market price. Farmers often incur expenditures for things, such as farm machinery, bunding and purchase of bioinputs to augment soil fertility and yield. In addition, various barriers like transaction costs (lack of access to relevant knowledge on cultivation practices, market), mandatory documentation required for inspection and certification, lack of demand in domestic market and constraints to enter international market and institutional factors restrict the spread of organic farming (Das, 2004).

Macro level issues: The macro challenges include impacts mainly on food security, employment, and environment. The question of food security assumes significance considering yield reductions of organic farming vis-à-vis conventional farming (Pandey and Singh, 2012), particularly in the two-to-three-year conversion period. Given India's history of inadequate food production, it is necessary to examine food security related issues, considering the large number of marginal and small farmers, before organic farming is promoted en masse. Another macro dimension of promoting organic farming is its impacts on rural employment. Organic farming is expected to increase employment opportunities owing to requirement of producing various agricultural inputs, like bio-fertilisers and biopesticides, using locally available materials. The scope for increased employment opportunities need to be assessed at the regional and national level. From the environmental point of view, apprehensions have been raised that organic farming might also lead to unsustainable problems, due to increased land and water use to offset decrease in yield. Considering the Indian case, even in organic practices water conservation must ultimately remain the paramount concern. Considering the various challenges to the adoption of organic farming the Working Group on Organic and Bio-dynamic Farming of the Planning Commission (GOI, 2001b) suggested examination of some important issues for effective promotion and practice of organic farming and sustainable agriculture. These include economics of organic crop production, economic and environmental externalities associated with conversion to organic farming, comparative study of chemical based and organic farming covering social, environmental, and economic costs.

Important issues regarding organic farming:

1. Large-scale conversion to organic agriculture would result in food shortage with the present state of knowledge and technology, as the yield reductions of organic systems relative to conventional agriculture average 10–15 per cent, especially in intensive farming systems. However, in traditional rainfed agriculture, organic farming has the potential to increase the yield, since 70 per cent of total cultivable land falls in this category. Mere 5–10 per cent increase in farm production would

definitely help to achieve the targeted growth rate of 4–5 per cent in agricultural production in the Tenth Plan period.

2. Organic manure is an alternative renewable source of nutrient supply. A large gap exists between the available potential and utilization oforganic wastes. However, it is not possible to meet the nutrient requirements of crops entirely from organic sources, if 100 per cent cultivable land is converted to organic farming.

3. Organic farming systems can deliver agronomic and environmental benefits both through structural changes and tactical management of farming systems. The benefits of organic farming are relevant both to developed nations (environmental protection, biodiversity enhancement, reduced energy use and CO2 emission) and to developing countries like India (sustainable resource use, increased crop yields without over-reliance on costly external inputs, environment and biodiversity protection, etc.).

4. Organic foods are proved superior in terms of health and safety, but there is no scientific evidence to prove their superiority in terms of taste and nutrition, as most of the studies are often inconclusive.

5.Combination of lower input costs and favourable price premiums can offset reduced yields and make organic farms equally and often more profitable than conventional farms. However, studies that did not include organic price premiums have given mixed results on profitability. Thus, it is the premium price on the organic food which decides the economic feasibility of organic farming, at least at the current rate of development in organic agriculture.

6.. In organic farming systems, pest and disease management strategies are largely preventive rather than reactive. In general, pest and disease incidence is less severe in organic farms compared to conventional.

7. Tropical forage legumes breeding programmes are associated with certain unique problems. Most of the tropical pasture legumes still possess traits of wild plants that include seed shattering, small seed size, seed dormancy, relatively slow germination rates, etc. In most of the cases we have very little knowledge about the basic biology of the species. Some of the problems include overlapping of vegetative and reproductive growth phases, uneven pod setting, non-synchronous maturity and seed shattering in forage legumes. Inherent heterozygosity as most forage species is cross pollinated. Self-incompatiblity limits the extent to which they may be inbred; small floral parts make artificial hybridization tedious; poor seed producers; or produce seed with low viability as well as inherently low seedling vigor and competitive ability. Many forage species produce weak seedlings and stands are not easily established. Strains may perform differently with different systems of grazing management. Persistence of perennial tropical forage legumes is not as a single trait, but rather as a complex of traits dependent on various factors, such as diseases, insects, abiotic stresses, or management stress. Fertility barriers of one sort or another are very common in tropical forage legume breeding viz., berseem owing to the wild nature of the species and inadequate knowledge of inter- or intra-specific variation.

In nut shell the performance of organic agriculture on production depends on the previous agricultural management system. An over-simplification of the impact of conversion to organic agriculture on yields indicates that

: • In industrial countries, organic systems decrease yields; the range depends on the intensity of external input use before conversion;

• In the so-called Green Revolution areas (irrigated lands), conversion to organic agriculture usually leads to almost identical yields;

• In traditional rain-fed agriculture (with low-input external inputs), organic agriculture has the potential to increase yields.

CONCLUSION

Organic farming provides a greater opportunity for producing good quality perennial fodder legumes with less production cost and better use of locally available resources. It also improves soil, animal and environmental health., maintains soil fertility. Proper research and breeding programs should be conducted to develop compatible variety and increase productivity by reducing the constraints for production.

REFERENCES

FAO, Organic Agriculture (Food and Agriculture Organisation of the United Nations, Rome, 1999)

https://encyclopedia2.thefreedictionary.com/Perennial+Forage+Grasses">Perennial Forage Grasses