Succession dynamics of grassland ecosystems of Central Mongolia

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During the last decades, anthropogenic impact on nature has become global, which brought about destruction, drastic transformation and change in natural ecosystems. The most drastic effect was that on grassland and steppe ecosystems in favor of human life and agriculture. The present experiment was carried out to find the individual groups of plant and indicator species at different stages of the grazing and reserve regimes in grasslands of central Mongolia. For floristic analysis, complete geobotanical descriptions based on the standard technique were processed by Braun-Blanquet method. The revealed associations were grouped within a single landscape type into series of digression. The position of each sub-association in the digression series was visually identified by assessment of the vegetation state and amount of rangeland pressure. Species with a similar trend of constancy variation were merged into sets differing
with respect to the response of species to livestock grazing, indicating the value of grazing pressure. The results of processing of geobotanical description data have revealed the following stage of digression I, II, III, IV and V which are correlated to data on the level of rangeland pressure. Stage I is developed under virtually complete absence of livestock grazing. In central Mongolia, land not utilized for grazing isolated by railroad (about 50 years). The main indicator species in this stage are dominated by *Stipa krylovii* and *Agropyron cristatum*. Stage II reflects a week impact of livestock grazing. This stage develops in communities undergoing a week pressure where dominated by *Koeleria cristata*, *Leymus chinensis* and *Stipa krylovii*. Stage III is rangelands under moderate impact of grazing. The dominants are *Cleistogenes squarrosa*, *Stipa krylovii* and *Artemisia frigida*. In stage IV heavy impact of grazing is observed. It covers areas situated near built-up areas and along transportation roads. The dominants are grazing resistant species: *Artemisia frigida* and *Carex duriuscula*. Stage V, very heavy impacted rangelands, comprises areas situated around winter places and built-up regions, where dominated by *Atemisia dracunculus*, *Salsola collina* and *Artemisia frigida*.

Key words: Succession, grassland, grazing, Central Mongolia

**Agropyron cristatum** as a native species for ecological development of Iran and Russia

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In order to conduct an autecological study of crested wheatgrass, catchments of west Azarbaijan were selected as case study units. Study of geographic distribution of crested wheatgrass was done in each catchment, considering geology formation and land from. Phenological studies were done at different intervals in the Bazargan, sero (kuh-e-Tapik) and salmas (Tamar Mountain). The results showed that crested wheatgrass was found in all Azarbaijan’s catchments from an altitude of approximately 800 to 3575 meters above sea level in all geographic aspects. The companion species of *A. cristatum* were 1-*Astragalus parrowianus*, 2-*Bromus tomentellus*, 3-*Achillea millefolium* and 4-*Stachys schetscheglievii*
The time of initial growth, vegetative growth heading, flowering, seed ripe and seed shed of crested wheatgrass in Bazargan are mid March, mid May, late May, mid June, late July and early September, respectively. The density, canopy cover and root extending of *A. cristatum* in Tapik, Tamar & Bazargan are respectively (1800, 1200, 1100 bunch per hectare),(3,2,2) and (130,80,85 centimeters).

The geologic studies indicated that the main habitats of the *A. criatatum* were Colored mélange and Qom formation. It grows best on medium-textured soils, from sandy loams to clay loams. Crested wheatgrass does not grow well in loose sandy soils, heavy clays, or saline soils.

Key words: West Azarbaijan province, crested wheatgrass, autecology.

**Seed germination and emergence responses of four native cool-season grasses under water stress**

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Iran is located in arid and semiarid regions. Limited water availability in these regions reduces seed germination, seedling establishment, and maintenance of perennial grasses in renovation of pastures.

A greenhouse study was conducted to determine germination, seedling emergence, and root and shoot growth responses of 4 native cool-season grasses, *Elymus elongatum* (from Brojen), *Elymus intermedium* (from Oromieh), *Elymus elongatoformis* (from Gorgan), and *Elymus repense* (from Oromieh) to 4 soil water content (FC, 75%, 50%, and 25% FC). Decrease in soil water content progressively inhibited germination of all species except *Elymus elongatum*. For example, decreasing soil water content from FC (100%) to 25% FC reduced total germination from 85 to 23% in *Elymus elongatum* species, while seeds of the other grasses only germinated between FC and 50% soil water content. A noticeable difference in seed germination and seedling emergence observed in the four grass species and no seedling emergence was observed at 25% FC. The number of days to 50% emergence for *Elymus elongatum* and *Elymus elongatoformis* were 9 and 12 at 50% FC level.
The two other species showed no seedling emergence at this level. Decreasing soil water from FC to 50% had no effect on shoot and root dry-weight in *Elymus elongatum*, but other species were greatly affected by drought stress. Our results showed *Elymus elongatum* is a drought tolerant species in seed germination and seedling emergence stage and could be useful for renovation of pastures in semiarid regions.

Key words: Seed germination, drought tolerant, water stress, field capacity (FC), *Elymus elongatum*, *Elymus intermedium*, *Elymus elongatoformis*, *Elymus repense*

**The Effect of Planting Distance on Growth of *Populus nigra* L. subsp. Nigra**

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The plantation of "*Populus nigra* L. subsp. Nigra" as a fast growing species in the east of Hyrcanian forests, at Shastkolateh in Gorgan, were considered in this research. This investigation was performed in 15 years age plantation of this species with two planting distance of 3×5m and 6×5m in Gorgan with altitude of 240 m asl, 920 mm precipitation, clay-sandy soil texture with pH of 7-7.5 and temperature range of −4 to 35°C.

For performing this investigation two stand, each one including 1278 and 960 m² area in dense and sparse soils respectively were measured completely. Diameter at breast height (DBH) and total height of trees was recorded. The soil was studied by taking one soil profile in each stand. The results showed the mean of DBH was 18.20 cm in dense stand and 22.9 cm in sparse stand. The mean of total height was 16.6m in dense stand and 16.5m in sparse stand. The comparison between means was performed by independent samples T-test that indicated a statistical significant difference in diameter but not in height.

The surface under curve and H/D ratio in 3×5m was more than 6×5m planting distance. The annual volume growth in dense stand was 8.17 m³ in hectare per year and in sparse stand was 7.66 m³ in hectare per year. The results showed the good adaptability of this species with the area and better growth of 3×5m in compare of 6×5m planting distance.

Key words: *Populus nigra*, plantation, Hyrcanian forests, Gorgan, Iran
The survey of degradation factors of pastures and determining their contribution rate in West Azerbaijan rangeland

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In order to survey range degradation factors and to determine their contribution rate, four towns with 33 communal boundaries and 157 users were selected by random sampling method. Dependent variables include degradation of rangelands and independent variables were: a. Mismanagement of the rangelands, b. Economic reason and c. Investment.

To collect information, interviews and questionnaires were taken into account. The method of research was of correlation and associational which utilized inferred statistics of correlation coefficient of Pierson. The results showed that: 1- There was a relationship between range mismanagement and range degradation (R= 0.93), 2- There was a relationship between range plowing and range degradation (R= 0.78), 3- There was a relationship between premature grazing and range degradation (R= 0.95), 4- There was a relationship between excess Animal number and range degradation (R= 0.96) and 5- There was a relationship between economic impetus investment and range degradation (R= 0.90)

Key words: Range management, range degradation, economic impetus, investment

Auteecology Study of Astragalus brevidens in Khorasan

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In order to using important range species for range improvement, identification of ecological conditions of these species is very important. Sainfoein Astragalus (Gandog.) Rydb. is one of the most important range species of semi-dry steppe like ranges in Khorasan province.

Here we studied distribution zones of Astragalus brevidens in Khorasan as well as companion species, main vegetation habitats, relationship between the species and topography, Geomorphology, soil
and climate changes. Furthermore, we reported the seed germination behavior, plant phenology under natural conditions, nitrogen fixation, root system, plant production and its reaction to grazing, some chemical compounds, main diseases and pests. Survey results showed that, habitats of this species was limited to the mountainy zones of north and center Khorasan. Many of companion shrubs such as *Onobrychis cornata*, *Astragalus heratensis*, *Acantholimon* spp. and grasses like *Bromus kopetdaghensis*, *Agropyron* spp, *Festuca ovina* and *Dactylis glomerata* were the most noticeable indicators. Range of altitude of *Astragalus brevidens* distribution was between 1250 and 2500 m above sea level. The areas mostly habited by this species are located at Binalood and Kopedagh geological formations. These regions are mountainous with calcareous soils and low alkaline ledges. Other habitats were gyps-free soils and low alkaline sediments. Soil textures were varies from silt to clay-loam. *Astragalus brevidens* favores cold semi-arid and mountainous climate. Annual rainfall in studied habitats is changing between 200-550 ml and monthly mean temperature is between 5.2 - 14.3°C. Seed of this plant has hard coat and germination increased with scarification. The highest germination was achieved at 15 degree centigrade. *Astragalus brevidens* has a nodule bearing root system with high crud protein deposition (20.4%). High palatability of this plant has caused over-grazing, resulting plant decline and limiting its communities to fenced pastures around cites and abandoned farm lands.

Key words: autecology, *Astragalus brevidens*

**The relationships between water use efficiency and several physiological drought resistance criteria in bread (Triticum aestivum L.) and durum wheat (Triricum durum L.)**

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Higher yield per unit of applied water is an important challenge in dry land farming. Improved water use efficiency and increasing the ratio of yield to evapotranspiration, might be one way to achieve this goal. To
evaluate the relationships between water use efficiency and grain more yield with higher osmotic potential, leaf extension rate and stomatal resistance, a greenhouse experiment was conducted in Agricultural College, Shiraz University during 2002-3 growing season. A factorial experiment in RCD design was used with two factors consisted of irrigation (well-watered, mild and severe drought) and genotypes (19 bread wheat cultivars and 2 durum wheat cultivars) with three replications. Drought significantly reduced water use efficiency, grain yield, grain number, biological yield and total water used. Stomatal resistance and water use efficiency were highly correlated especially under drought conditions. Stomatal resistance was introduced as a selection criterion for genotypes with high water use efficiency notably under drought conditions.

On the basis of cluster analysis line Sub’s’ was found to have high water use efficiency and grain yield capacity while Shiraz cultivar showed low water use efficiency and grain yield capacity under water limited conditions.

Key words: Drought, stomatal resistance, water use efficiency, wheat

**Felling and Winching damage on residual stand following selection logging in a Seyahkal forest (North of Iran)**

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Seyahkal forests in east of Gilan province, Iran, involves hardwood species such as Beech (*Fagus orientalis*) and Hornbeam (*Carpinus betulus*), that is managing by selection logging. The forest is logging by a private company under a government concession. A total density of 2.4 tree/ha and 12.77 m³/ha of wood (113 tree in 31 felling gaps) were harvested. The felling and winching damage on residual stand (dbh>10cm) was assessed in total felling gaps and winching strips with the 100% survey. The most common types of damage included uprooted stems, stem wounds to the cambial layer, and bark scrapes.
Seventy-seven percent of the wounds were less than 100cm², with 71.7% of the damage occurring on the stem and 28.3% of the damage on or below the root collar. Forty-six percent of the wounds produced by felling operations, while only 17.5% of the wounds were produced by skidding operations. Usually, wounds on trailside trees were larger than wounds on trees of felling gaps.

Key words: Hardwood forest, selection logging, residual stand damage, felling gaps, winching strips

**Autecology of Puccinellia distans (Jacq.) Parl. In saline and alkaline habitats North Gorgan region**

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In this study type of soil, forage production, phenology, palatability, chemical composition germination and other parameters were investigated in three distinct areas: sea shore area, Gomishan and Sangar Tapeh. *Puccinellia distans* is a perennial grass which grows in the north region of Gorgan with high water table and slow drained heavy texture saline and alkaline soil. It is an obligate halophytic plant which is well adapted to 300 mm rainfall and has good regeneration. Growing initiation is from the early autumn and seed ripening is occurred in late spring, the spikelet may remain until end of autumn. Chemical compositions showed that the percentage of protein during vegetative growth was 14 to 16% and during the seed ripening stage was at least 3.6 to 4.4%.

Comparison of palatability of *Puccinellia distans* with associate species using method of feeding minutes showed its higher rank, put it in the first class.

It can be reproduced with seed and also root division and spread rapidly with seed. Propagation can obviously be improved by protection of its habitats. Seeds germinate in temperature between 20 to 25 °C up to 50%. Forage production in sea shore area, Gomishan and Sangar Tapeh were 187, 691, 800 kg/ha, and land coverage with plants were 53.4, 48.8 and 40.3% respectively

Key words: Autecology, *Puccinellia distans*, Saline and Alkaline soils, Gorgan
Energy efficiency of irrigated wheat production in traditional and mechanized systems at East Azerbaijan province, Iran

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Ecology of agroecosystems have suffered sever variation due to human mediation with the goal of maximizing energy and matter flow. Application of some input such as fertilizer, pesticides, herbicides and fuels in mechanized agriculture counted direct and indirect form of subsidiary energy. In fact yield increment in modern agriculture is mainly the result of large amount of input and energy consumption (for crop planting, protection and harvest). However in some cases subsidiary energy at intensive systems will reduce the energy efficiency.

Wheat (Triticum aestivum L.) is the most strategic crop can affect the economy of a country. In recent years, self-sufficiency in Wheat production has been an important priority of the Iran government. The most planted area in east Azerbaijan province is covered by wheat (100,000 ha for irrigated and 320,000 ha for dry farming wheat). This research tries to investigate the energy balance of wheat production under traditional and mechanized conditions. Required information was obtained via technical questionnaires, which distributed between farmers. Energy efficiency was calculated by output to input ratio in both systems. Results showed that energy efficiency in traditional system (2.38) was higher than modern system (1.83). Incasing input energy in modern system increased yield, but reduced the energy efficiency.

This finding confirms the Mitcherlikh subtractive efficiency law. In spite of higher energy efficiency in costume system, total energy production per area unit was lower than mechanized one due to its low yield. From another point of view the ratio of input and output energy of mechanized to traditional system were 3.53 and 2.27 respectively. Therefore energy dissipation was more in modern cropping systems. It would be stated that more production in mechanized system need to more input energy. So based on general objects of sustainable agriculture and with considering the economic and environmental issue
the intensive agriculture is not a good strategy for food production at future.

Key words: Wheat, *Triticum aestivum*, sustainable agriculture, traditional agriculture, Mechanized system and energy sufficiency

**The pollution effect of Persian Gulf War on the physiological reaction of oak (*Quercus brantii* var. *Persica*) growth in southwest of Iran**

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During the Persian Gulf War, different ecosystems were damaged severely in the southern and southwestern regions of Iran. Pollutants in some physiological aspects such as wood growth affected trees. In this project, annual growth rate was measured within 20 individuals and compared in oak trees (*Quercus brantii* Lindl. var. persica) during 14 years by dendrochronological methods. Counting the annual nodes, a 14 years-old branch was selected from each individual and used for preparing a disk. Disks were dried at 60°-80°C and then polished by rubbing. The annual growth rate was measured by use of stereomicroscope and a computerized program (Motic) in two vertical directions from center of wood toward cambium layer and analyzed statistically. Moreover enzymatic reactions against the pollution effects were studied. Results indicated that annual growth in 1370 (stress year) showed a decrease in compare to 1371-1379 (after stress year) and to 136-1369 (before stress year) in spite of more rainfall in 1370. This indicated effect of pollution on growth decrease. The enzymatic reaction has confirmed these results. Results could lead us to usage of trees as a suitable indicator for ecological assessment.

Key words: Pollution, dendrochronological Analysis, tree-ring records, *Quercus brantii*, enzymatic reaction, Persian Gulf War
Determine of soybean phenological model in Isfahan region

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Data from soybean breeding and agronomic trials conducted at different locations in Isfahan during 1994-1998 were used to develop models for estimating development stages (DS) and evaluating the effects of temperature and evaluating the effects of temperature and day length on development of three soybean cultivars; steel, hawck and williams.

Actual duration and reverse of duration (RD) were considered as the dependent variable and various temperatures, day length and combinations of these variables as the independent variables in a stepwise regression procedure.

The results of this study indicate that cultivars vary for response to day length and temperature. $T_{\text{max}}$ explained the most part of variation in RD during planting to emergence of all cultivars. RD during emergence to flowering was mostly explained by $DL^2 \times T_{\text{min}}^2$ for steel and by $T_{\text{mean}}^3$ for Hawck and williams. During emergence to pod setting, RD was mostly explained by $T_{\text{mean}}^3$ for Hawck and williams, and by $DL \times T_{\text{min}}$ for steel. A small portion of variation in RD during emergence to maturity for Hawck and williams was explained by DL and no variable could significant explain this for steel.

Key words: Soybean, stepwise regression, development rate, phenological model

Ecological importance of desert plant communities on controlling desertification processes (case study: Ferdows region in Khorasan province)

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Vegetation cover of Ferdows region (an area about 1,526,000 hectare in south of Khorasan) was studied and overlaid on topographical map (NI 40-7), during 1996-1999. In this survey, vegetation types and communities, associated plants and land use systems were identified by physiognomic and floristic methods. Also, three dominant species
were considered as vegetation type. Then ecological characteristics of each plant community or vegetation type were registered. The most important ecological characteristics included climate, soils and land resources, geology and geomorphology, life form; land slope and more other information were collected through references. The base maps were provided in scale of 1/50,000 and then changed to 1/250,000 by Ilwis software.

Results indicated that vegetation communities or types, agricultural lands, bare lands (playa or Kavir) and rocks were covered 73.3%, 4.25%, 21% and 1.36% of total area, respectively. In addition, 40 vegetation types or communities were identified and classified into 6 main groups as *Artemisia*, *Scariola*, *Amygdalus*, *Haloxylon*, *Salsola* with 69.2%, 6.1%, 2.8%, 3.5%, 3.6% of total vegetation types, respectively and some individual plants types with 14.8% of total vegetation types.

Also, under arid conditions of studied region, some plant communities such as *Artemisia sieberi*, *Amygdalus scoparia*, *Haloxylon* spp., *Siedletzia rosmarinus*, *Salsola* spp. control wind and water erosion consequently and stopped desertification process. In spite of combat desertification phenomenon in desert plant communities, development of cultivation area and overgrazing lead to appear invader plants consequently increased hazard desertification by degrading lands and unsustainability of production.

Key words: Ecological factors, plant communities, physiognomic

**Autecological study of Melica persica in Khorasan**

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Over exploitation of range plants caused reduced vegetation cover and biodiversity, risk of extinction of species, soil erosion and generally unsustained ecosystems. Preventing this unsustainability involved having information about autecological requirements of important plants, their environment and their interactions. *Melica persica* is a perennial grass (Poaceae family) with a wide adaptability so that make it an important range plant, especially for soil conservation. It is native to Iran, where it is most common in the Irano-torani and Hyrcanian regions. This research was conducted to study the autecology of *M. persica* in Khorasan, 1997-2000. Objectives were to study distribution,
morphology, topography, meteorology and climatology, edaphic parameters, geology, vegetation cover, phenology, regeneration strategies and seed longevity of this species. Geology and meteorological and climatological parameters were studied using related maps, field check and data of meteorological stations. Quadrates of 1×1 meter were used to study vegetation cover. Phenology was studied on 10 marked plants in 10-15 days intervals on 3 habitats.

Results indicated that *M. persica* is a widely distributed and well-established range plant in most of rocky foothills (altitude 900-2900 m) from north to south of Khorasan. Temperature and precipitation of *Melica* habitats were 5-15 degree centigrade and 125-600 mm, respectively. 80% of *Melica* habitats are located in three climates of very cold semi-arid, very cold Mediterranean and cold semi-arid. *M. persica* prefers loam, silt loam, sandy loam and gravelly well-drained soil with pH 7-8 and EC 0.5-1.5 ds/m. The parent rocks are sheil, volcanic and lime stone. Vegetation phase initiated from mid March and changed to reproduction phase in late May. After seed shedding from July, the plant goes to summer dormancy and regrows in autumn. It regenerates both sexually and asexually. Seed viability was not reduced after 5 years storage at room temperature.

Key words: *Melica persica*, autecology, phenology, seed viability, regeneration, Khorasan

**Assessment of mangroves habitats by plant and soil enzymes studies in Boushehr province**

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Different studies were done for estimating of war pollution effect that happened in Persian Gulf in January 1991. In this study soil and plant enzymes determined the effect of pollution. In three different natural habitats of *Avicennia marina* (Assaluyeh, Bordekhoun and Dayyer). Fifteen healthy trees were selected. Branches related to each annual growth ring during 1989-2000 were separated for plant enzyme
analysis using mixture of same years of different trees in each habitat (as a regional indicator). The peroxidase analysis was done quantitatively and qualitatively by spectrophotometric and polyacrylamide gel electrophoresis (PAGE) methods, respectively. In addition soil sampling was taken from different depths and transported in 40°C to laboratory. Four soil enzyme assay (Acid and alkaline phosphatase, dehydrogenase and β-D-glucosidase) were done by use of special substrate and colorimetric methods. There was conformity between soil and plant enzymes.

Assaluyeh (a conserved habitat) showed no abnormality in soil enzyme and plant indicator gel pattern but plant indicator gel pattern of Bordekhoun and Dayyer habitats showed abnormal patterns. In addition results of soil enzymes indicated abnormal situation in two mentioned habitats. Results implied that conserved ecosystems resist against pollution better than exploited ecosystems. Results also showed that tree could be used as suitable indicator for monitoring of pollution effects on natural ecosystems.

Key words: Mangrove, soil, peroxidase, phosphatase, glucosidase, dehydrogenase

Microbial ecology of nitrogen cycle in soils and ecosystem functioning

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The quantitative assessment of the roles of fungi and bacteria in nitrogen transformation in virgin and cultivated soils was done. Measurements of biomass of bacteria and fungi, selective inhibition of their activities in the soils and comparisons of activities of inoculated fungal and bacterial strains in sterile soils with rates of N processes in native soils were performed in laboratory experiments.

Fungi were responsible for most of ammonification (80%) of ready available N compounds (peptone) added to the forest soddy-podzolic soils. In the arable soils bacteria and fungi had an equal contribution to the mineralization of peptone to NH₄⁺. Heterotrophic nitrification (mainly fungal) was higher in virgin soils than in cultivated soils of the same types. Contribution of heterotroph microorganisms in nitrate production was highest in the soils of mature spruce forests (about 90%); it was much less (10-40%) in the soils of other natural
ecosystems (broad-leave forests, grasslands). Autotrophic bacteria were responsible for 87-97% of nitrate formation in cultivated soils. N₂O production by fungi attributed less than few percents to denitrification potential of soils. Cycloheximide depressed N₂-fixing activity of soils enriched by plant residues with 60-70%. It proves that fungal extracellular hydrolysis of plant polymers provided major part of available carbon for heterotroph N₂-fixing bacteria in soils. Fungi play a leading role in microbial immobilization of N in soils. Their biomass predominates (60-90% of total microbial biomass) in the majority of soils, particularly in the soils of the natural ecosystems. It was accounted that synthesis such resistant to degraded compounds such as melanin and melanin-chitin complexes is one of key mechanism of maintenance and accumulation soil organic nitrogen. Functional capacities of bacteria and fungi in N processes in many aspects have duplicative or additive character. It could be considered as a factor of resiliency of N cycle in terrestrial ecosystems. Fungi cause maintenance and long-term deposition of N in soils. Increase of bacterial dominance in soils intensifies N turnover and due to their major role in nitrification and denitrification, losses of soil N elevates. Destruction of native vegetation, conventional farming lead to a shift from fungal to bacterial dominance in soil N processes that increase N losses. Alternative agricultural systems that maintain a high level of fungal biomass could be more effective than conventional systems in retaining the N capital of the soils.

Key words: Bacteria, fungi, ecosystem, nitrogen, soil

A survey of nutritive value of the grass family (Gramineae) species in rangelands of Kerman province, Iran

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In order to determine the chemical composition and digestibility of dominant grass family species, eight were sampled at flowering and mature stages of the plant, throughout the Kerman Province in south-eastern of Iran. All samples were chemically analyzed according to the standard methods and the digestibility was measured using in vitro technique. Digestible and metabolizable energy (DE and ME) content
as well as total digestible nutrients (TDN) were estimated by the regression equations.

Average crude protein (CP) content of two sampling stages was between 7.5 to 10.1 percent in dry matter (DM) with the lowest for the \textit{T. crinitum} and the highest amount for the \textit{A. lagopoides}. There were not much variation between the flowering and seedling stages for the CP content of the above plants except for \textit{S. capensis}, which had 6.6 and 11.8 percent of CP at flowering and seedling stages respectively. The concentration of ether extract (EE) varied from 0.73 to 1.16 percentages in DM and ash content of the samples was different from 6.3 percent for the \textit{S. Barbara} to 12.9 percent for \textit{A. lagopoides}. Neutral detergent fiber (NDF) and acid detergent fiber (ADF) were between 66.9 to 80.6 and 38.8 to 51.0 percent respectively which were different among the plants. \textit{S. barbata} had the highest amount of NDF and ADF concentrations, but \textit{A. lagopoides} and \textit{B. danthonia} had the lowest amounts of NDF and ADF respectively, but a relatively similar concentration of NDF as well as ADF were observed in both stages of sampling for each species. The average digestibility of DM and OM of two stages were 39.1 and 40.3 for \textit{Stipa barbata}, 63.6 and 65.5 for \textit{Bromus tectorum}, 42.8 and 44.5 for \textit{Stipagrostis plumosa}, 63.0 and 64.4 for \textit{Bromus danthonia}, 51.0 and 52.8 for \textit{Teaniatherium crinitum}, 33.7 and 39.5 \textit{Stipa capensis}, 37.1 and 38.4 \textit{Aeluropus littoralis}, 48.4 and 46.6 for \textit{Aeluropus lagopoides} respectively.

The average TDN content of two stages of the plants was 47.8, 56.9, 52.7, 57.4, 53.5, 57.5, 55.8 and 54.4 percent respectively. There were no major changes between the flowering and seedling stages of the herbages for digestibility and TDN content. The estimated DE and ME were 2.1 and 1.7, 2.5 and 2.1, 2.3 and 1.9, 2.5 and 2.1, 2.4 and 1.9, 2.5 and 2.1, 2.5 and 2.0, 2.4 and 2.0 Mcal/kg for the mentioned species respectively. It can be concluded that the dominant Gramineae herbage in dry-lands of Kerman at the stages of flowering and seedling, contained CP and energy enough for the extensive system grazing small ruminants in the area.

Key words: Nutritive value, range, Gramineae species, Kerman, Iran
A study of the effect of moisture-temperature factors on the germination of oak (*Quercus brantii*) seeds in Khorramabad, Lorestan - Iran

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In this paper influence of storage conditions (humidity and temperature) on the germination of Iranian oak (*Quercus brantii* Lindl.) seeds under Lorestan province climate was investigated. The research has been carried out with 3200 seeds based on completely random configuration of four factors and quadruple repetition. Seeds were planted in plastic pots, at 5 cm depth according the following factors. Factor A- seeds were stored on fresh air for a month, and then planted in pots. Factor B- seeds were planted immediately after gathering. Factor C- seeds were stored in a refrigerator within one month at the temperature 1-5 °C, and then planted. Factor D- seeds were wetted after gathering with tap water for 48-hours and then stored for one month in a refrigerator at the temperature 1-5 °C, then planted.

As a result of the analysis it was shown, that there are significant differences between the factors. Comparison of germination of seeds (under Duncan test) has shown that four factors correspond to two classes: the class a includes factors B, C and D with germination percents of 95.50%, 97.38%, and 98.50%, respectively. The class b includes the factor A with germination percent of 23.00%. According to the results, the factor B would be the most suitable method of planting seeds for renewal of oak forest of the western Iran.

Key words: Oak seed, seed germination, moisture content, temperature

Autecological Study of *Salsola oreintalis* s.g. Gmelin in Khorasan

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Conservation and rehabilitation of vegetation cover is a very important issue, because development of every country is depended on survival of these resources. Abnormal harvesting from rangelands is caused soil erosion and also reduction or totally extermination of palatable species
in areas where they are expected to be. Hence, Autecological study of adapted species is very important. *Salsola orientalis* is a perennial palatable plant of Chenopodiaceae family. Recently, drought and overgrazing have caused many of its habitats to be degraded.

This research was conducted to study autecology of this species since 1997. Objectives were: study of habitat characteristics, morphology, topography, edaphic parameters (EC, pH, Na⁺, K⁺, gypsum and lime), geology, land use, climatic factors, vegetation cover, phenology, seed germination, longevity and regeneration.

Geology and land use of *Salsola orientalis*’s habitats were studied using geology and land use maps and files check. Twenty plants were marked in two habitats and their phenology and morphology were studied in 10-15 days intervals. Vegetation cover was studied using 50 meter strip transect and 1×1 meter quadrates.

Results showed that the altitude of habitat ranges between 500-1500 meter and spread in all geographical directions and slops. This species is compatible to deep and moderately deep solis, with sandy loam to silty loam texture, pH 7-8 and gypsum present in depth, but it is less tolerant to salinity than other *Salsola* species. This species is more frequent on Quaternary alluvial sediment especially on losses. Temperature and precipitation of habitats are 10-17.5 degree centigrade and 150-400 mm and mainly located in cold-desert-arid climate. *Salsola orientalis* was not observed as a dominant species in it’s habitats. The most important plant type were mainly *Artemisia diffusa*, *Artemisia sieberi*, *Poa bulbosa* and other *Salsola* spp.

Vegetation growth initiates from early March and transforms to flowering stage in late May. Since the plant is indeterminate, vegetative growth continues during flowering stage. Seed setting initiates from early September and gradually ripens in late November and then shedding starts. The plant regenerates with seed. Seeds have high viability after gathering but they lose the viability during storage after 3 years.

Key words: Autecology, *Salsola orientalis*, phenology, seed germination, seed longevity, Khorasan
The relation of plants length growth with abiotic factors in the rangeland ecosystems of desert regions

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The growth properties and phytomass forming in the arid ecosystems are directly resulted from drought climate conditions. These properties consist of low vegetation cover of the soil surface, seasonally growth of different life form relatively low production of phytocenosis and fluctuation of quantity of production from one year to next year. According to the mentioned factors, determination of the rate of grazeable parts of plants is necessary for each year which is a big problem in the arid ecosystems. Phytomass is formed by length growth of young buds, density of plants in the surface unit and re-growth of the current year. The density of perennial plants changes a little yearly, but height growth of buds depends on ecological conditions including rainfall, soil humidity, etc.

The data of climatology station in the arid regions of Uzbekistan and Iran and the data of length growth young buds are analyzed by statistical methods and finally the regression relation of ecological factors including sum of rainfall in December to May, the volume of soil humidity of different horizons and effective temperature with maximum height growth of young buds, were compared. The correlation coefficient was between 90-98% and the error rate was not exceeding of 2-11%. The results indicated that the rate of rainfall in some special years was an effective factor on the formation of the humidity supply in soil. This factor with the effective temperature was the main ecological factor which effect the formation of rangeland vegetation production and length growth of young buds.

Key words: Length growth, rangeland plants, abiotic factors
Proteolysis system in higher plants under salt stress conditions

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Seeds of yellow lupine (*Lupinus luteus* L.) and barley (*Hordeum vulgare* L.) were germinated in distilled water (control) and in solutions of 0.1 and 0.2M NaCl for 120 hours. The effect of NaCl-stress induced activity inhibition of neutral, acid, alkaline (BAPA-ase) proteases and trypsin inhibitors in germinating lupine seeds. Species specificity of plant reaction to the action of chlorine ions was noted. In barley, a more salt resistant crop, saltification causes activation of neutral proteases by 75% with respect to the control in the first 24 hours of germination. An increase in the activity of trypsin inhibitors was observed in barley leaves at the flag stage.

Key words: barley, chlorine ions, lupine, proteases, trypsin inhibitors

Investigation of some ecological characteristics of *Ferulago angulata* in Dena protected area

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*Ferulago angulata* is a perennial medicinal-industrial plant that wildly grows in some rangelands of Iran especially in Zagros Mountains regions. This plant is endemic in Iran and any ecological study had not been done about it in our study area. The aim of this study was to precisely investigate its ecosystem and measurement its density, weight, and their changes in aspect, slope and variant altitude. Also active substances of plant (secondary metabolites) and soil types were studied. Result showed that density and weight of *Ferulago angulata* are higher in north, northwest and west aspects, in slope 12-30 percent and in altitude more than 2000 meter. Amount of essential oils of *Ferulago angulata* in flowering stage is 1.8% plant dry weight that the
most important of them are α – Pinene (24.7%), β- z – Ocimene (18.9%), Sabinene (17.2%) and γ –Terpinene(6%).
On the basis of soil analysis, *Ferulago angulata* prefers sandy loam soils. Meanwhile side results showed that pH and EC are the most important factors in germination and growth of *Ferulago angulata*.

Key words: Umbelliferae, *Ferulago angulata*, medicinal- industrial plant, active substances, secondary metabolites, rangeland, Dena

**Study on forage quality of two Poaceae species in three phenological stages**

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In the present research, two Poaceae species viz. *Avena flavescens* and *Bromus pinnatus* were selected and their life span was studied in three phenological stages i.e. vegetative growth, flowering and seeding in ten replications in Ramsar, north of Iran. Different factors of forage quality which were crude protein, total energy, acid detergent fiber, digestibility and metabolizable energy were determined using lab experiments.

Variance analysis and T-test of data made by the help of SPSS software showed that total energy was having irregular variation and therefore could not be resulted in a statistical format. Crude protein was decreased from the first stage to the last stage and therefore forage quality was declined. Other quality factors were almost constant during the different phenological stages for both species.

Digestibility and Metabolizable Energy of *Avena flavescens* species were more than another species, therefore, the forage quality of *Avena flavescens* species were better in the area in comparison to another species.

Key words: Forage quality, digestibility, metabolizable energy, ADF, crude protein, *Avena flavescents, Bromus pinnatus*, Ramsar, Iran
Possibility of shallow tillage in the irrigated wheat of Fars, Iran

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Every year the degradation of agricultural soils increases due to improper tillage operation. The main objective of this study was evaluation and comparison of surface and conventional tillage methods by measuring wheat yield and its components. The study was conducted in three consecutive years with two treatments and four replications. Conventional tillage method included moldboard plow, disk harrow and leveler planting with grains drill. Surface tillage method moldboard disk harrow in the depth of 6-8 cm after removing residuals, disk harrow in the depth of 12-15 cm in the fall and spike tooth harrow and planting with grains drill.

Experiments were arranged under a randomized complete block design in a split plot with four replications. The year of experiment was assumed as a main plot and two tillage treatments were considered as sub plots. Results showed that conventional tillage was better than surface tillage in terms of grain yield, number of heads in unit of area, number of grain per head, weight of 1000 seeds, and weight of the straw as well as harvesting index. But some replications had significant difference. The average yield of conventional tillage was 1.07% (about 227 kg/ha) higher than surface tillage. This difference might be due to higher plowing depth that cause root development and better residual burial with moldboard plow cause better performance in grain drills.

Since the farmers in Iran, cultivate at least two times per year, the period of soil preparing is usually short. Contrary to surface tillage, conventional tillage needs more time, energy and causes more implements depreciation. Since soil preparation with surface tillage is faster and there are no significant differences between the yields of two methods, the surface tillage is recommended in the irrigated wheat cultivations in Iran. If consuming energy, wasting time and expenditure is not important, using moldboard plow would be suggested.

Key words: Shallow tillage, surface tillage, wheat, yield
The study of effective factors on distribution of wild almond (Amygdalus scoparia) in two various areas of Fars province

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Determining the wild almond distribution related to ecological factors the species can found in type was done in some regions of Fars province as a research. After field consideration and using maps in the scale of 1:50,000, is showed that this species are founded in Firoozabad, Fasa, Arsanjan, Dashte-Arjan and Kazeroon as topic stands. In the next step based on availability and costs, two areas that named Dashte-Mook in Firoozabad and Derbak in the north west of Shiraz were selected for the research.

The sampling technique was random method and liner-squares selected. Considering the lowest altitude point toward the highest point using exact azimuth and passing each 100 meter differences in altitude, a 1000 meter square sample plot was applied. In each plot some parameters were measured and the results are as fallows. The species such as Amygdalus scoparia, A. lycioides, A. orientalis, Acer cinerascens, Daphnea macronata, Pistacia mutica and P. khinjuk had the widest distribution area in Dashte-Mook. In this area the number of wild almond was 83 per hectare and in Derbak was 111 per hectare. Plant diversity in Derbak area was lower than Dashte-Mook, and species such as Oak (Quercus persica), Amygdalus scoparia, Pistacia mutica and Cratagus sp. were widely distributed In Derbak area.

One of the most important affecting factors in wild almond distribution was geographical aspect to some extent that this species is appeared in southern, eastern and south-eastern aspects. Altitude was an effecting factor in distribution of wild almond, the densest areas were located in 1900-2150 m above sea level (asl) in Dashte-Mook and 1600-1870 m (asl) in Derbak area. Regarding to climate situation, the wild almond habitat are semi-arid, arid and warm Mediterranean as well as humid and arid regions. Regarding to geology and penology conditions the wild almond habitats are often located on mountainous and rocky areas and on Asmari, Pabde-Gurpi, Gachsaran and Bakhtiari sites and also
on undeveloped and eroded alkaline soils, with the texture of loamy, clay and clay-loamy.

Key words: Wild almond, plant distribution, Firoozabad, Dashte-Arjan, Fars

**Fumigation toxicity of plant essential oils against four stored-product insects**

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In an attempt to find natural and cheaper methods for the control of stored-product pests, fumigation toxicity of essential oils of *Artemisia aucheri* Boiss (Asteraceae), *Salvia bracteata* Banks & Soland (Lamiaceae) and *Nepeta cataria* L. (Lamiaceae) were tested against four stored-product adult insects, *Callosobruchus maculatus* F. (Col.; Bruchidae), *Tribolium castaneum* Herbst (Col.; Tenebrionidae), *Sitophilus oryzae* L., *Sitophilus granarius* L. (Col.; Curculionidae). Essential oils were obtained via steam distillation. Experiment was carried out at 30 ± 2°C and 60 ± 5% R.H. under dark condition and designed based on a split plot test with five replications. After 48 h. of fumigation, mortality of adult insects was found to increase as the essential oils concentration increased.

Essential oil of *A. aucheri*, *S. bracteata* and *N. cataria* at the highest concentration (0.926 µl / cm³) caused 84.41, 76.52 and 73.41% mortality on *C. maculatus*, 85.41, 75.15 and 72.33% on *T. castaneum*, 84.70, 76.26 and 78.00% on *S. oryzae* and 83.04, 78.00 and 75.33% on *S. granarius*, respectively. During the 3, 6 and 9 h. after fumigation of essential oil of *A. aucheri*, adult insects of *C. maculatus* with 20.33, 35.70 and 47.96% mortality were found more susceptible than other insect species. Essential oil of *A. aucheri* was more effective than the other plants, and during 24 h. of fumigation its LC50 was 0.1074, 0.1221, 0.1277 and 0.1389 µl/cm³ for *C. maculatus*, *T. castaneum*, *S. oryzae* and *S. granarius*, respectively. It may be concluded that plant essential oils can play an important role in stored-grain protection and reduction of the risk of chemical insecticides application.

Key words: Essential oil, *Artemisia aucheri*, *Salvia bracteata*, *Nepeta cataria*, fumigation, insecticide
Dormancy-breaking protocols for *Ferula ovina*

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*Ferula ovina* is one of grazing plants that belongs to Umbeliferae. This plant grows in grazing lands of Isfahan and Chaharmahal. Despite many tries by natural resource management techniques, due to over grazing the natural distribution of this plant is depleting. Unfortunately, our knowledge on dormancy breaking of *Ferula ovina* seed is nil. This investigation was carried out to study some involving factors on seed dormancy breaking of this plant. Dormancy breaking protocols were including of evaluating of effect of factors: pre-washing, pre-chilling on filter paper, stratification in sand layers, alternating-temperature regims and use of KNO3 and GA3 solutions. Results showed that pre-washing had no statistically significant effect. Stratification had similar results of pre-chilling. Pre-chilling in 0-3°C for 7-9 weeks on moist filter paper was the best treatment for seed dormancy breaking. The addition of 500 ppm GA3 in above mentioned conditions increased significantly seed germination rate. Also a significant increase in germination was obtained using 1% KNO3 solution only at 20/30 °C altering temperature regim. Our results let us to suggest that special conditions is necessary for dormancy breaking of *Ferula ovina* seeds that these should be noted for recovering of this plant, which spreads on range lands of Iran.

Key words: Dormancy breaking, *Ferula ovina*, pre-chilling, GA3, KNO3, alternating temperature

Investigation of peroxidase and catalase activities to different environmental stresses in *Fagus orientalis*

Lipsky

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The ability of higher plants to scavenge active oxygen seems to be very important for tolerating environmental stresses, since some of the stresses are thought to promote the production of active oxygen in plants. Activity of peroxidase and catalase will increase in response to
different environmental stresses such as low and high temperatures, high light intensity, elevated ozone concentrations and etc.

In the present study, we investigated peroxidase and catalase activities in oriental Beech (*Fagus orientalis* Lipsky). This assay was conducted during a year at three altitudes.

The results showed that activity of peroxidase and catalase enzymes were considerably higher in winter than summer. Amount of these enzymes decreased with increasing temperature mean and their activities reached to minimum in June. In July peroxidase and catalase started to increase. Peroxidase activity was not shown significant difference at three altitudes but catalase activity of high altitudes were significantly higher than lower altitudes because at high altitude there was unfavorable environmental conditions such as low temperature (in winter) and high light intensities (in summer).

Also this study showed there was a maximum of peroxidase activity in November (beginning of cold period), that it demonstrated peroxidase role in early response to different stresses and may provide cells with resistance against formation of H₂O₂ but there was a maximum of catalase activity in February when mean temperature was the lowest.

Key words: Catalase, peroxidase, *Fagus orientalis*, and environmental stresses

**Growth analysis of lucerne (*Medicago sativa*) cultivars and capeweed (*Arctotheca calendula*) under two temperature regimes**

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The growth patterns of capeweed and different lucerne cultivars in response to temperature were determined. The objective of this study was to investigate the response of a wide range of winter-active and winter-dormant lucerne cultivars and capeweed to environmental variables, particularly temperature as a factor that may contribute to competition between those species during seedling establishment. In general, capeweed grows faster during establishment than lucerne irrespective of temperature. Temperature had a greater influence on early growth of lucerne than to capeweed. The temperature regimes resulted in differences in the vigor of growth of lucerne during
establishment and these to a limited extent, were related to the
dormancy rating of the cultivars.

Key words: Ambient temperature, capeweed, controlled temperature, leaf area
lucerne, root dry weight, shoot dry weight

**Infection of Ulmus glabara, Acer vetilinum and Taxus baccata with endomycorrhizal fungi in Vaz forest**

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Mycorrhiza is a sustainable symbiosis between plant root and fungus. Mycorrhiza is divided to two main groups of ectomycorrhiza and
endomycorrhiza. Different studies have shown the effect of
endomycorrhizal symbiosis on physiology of forest tress. This study
was done in part of Hyrcanian region in north Alborz in Vaz forest.
Studies were done on three important forest trees including Ulmus glabara, Acer vetilinum and Taxus baccata. Two first species are
important industrial species in forests of Iran and are located in
Hyrcanian regions where growth condition is suitable. Taxus baccata
is an extincting conifer species and is used for wood production and
secondary metabolites such as taxol. Samplings were done from hair
roots and rhizosphere in four replications for each species in spring and
autumn in two consecutive years. Roots were stained by Philips and
Hayman method. Spores of mycorrhizal fungi were isolated by wet
sieving method and identified by different keys. All the tree species
showed infection by mycorrhizal fungi. The results indicated the more
number of fungal spores in rhizosphere in autumn in compared to
spring. Number of spores in rhizosphere of Taxus was more than two
other species in both seasons.

Three different fungal genera were found in each species rhizosphere.
In Acer vetilinum and Taxus baccata rhizosphere were identified four
species of Glomus, one species of Gigaspora and one species of
Aculospora whereas in Ulmus glabara three species of Glomus, two
species of Gigaspora and one species of Aculospora were isolated.

Key words: Symbiosis, Ulmus glabara, Acer vetilinum, Taxus baccata, vsicular-
arbuscular
Ecological protection of wheat crops against shield-backed bug (*Eurygaster integriceps* Put.): perspectives

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Shield-backed bug (*Eurygaster integriceps*) is a very harmful pest in the winter wheat fields of the South of Russia. We suppose that the density of this bug may be significantly decreased by the Ecological Pest Management. EPM is a special strategy of plant protection based on the maintenance of natural stability of agroecosystems. It excludes all the methods which upset the balances (like chemical ones). In limits of EPM we would like to propose at least two possible methods of plant protection against the bug. 1- Narrow artificially made strips (about 1 m) "beetle banks", covering by typical plants from local flora and crossing the field. The density of the bug population is always higher on the big fields (over 50 ha) than in small ones because many parasites and predators cannot reach the central part of the big field.  
As a result, density of the bug population is maximal just there. Parasites and predators can find convenient sites for overwintering, egg laying and development in the strips. These strips should be in the same place from year to year and accumulate plant debris. Such debris after maize and sunflower crops can also serve as a shelter for parasitic wasps and some other entomophagous arthropods for winter, so wheat should be sown after these cultures. 2- Alternative hosts management for Telenominae wasps. The eggs of *Eurygaster integriceps* may be found only from the second half of May till the beginning of June. Later in summer Telenominae wasps search for the eggs of Pentatomidae bugs. In the South Russia the most perspective host may be *Graphosoma lineatum* L., an oligophagous bug feeding on umbelliferous plants. Hence it is desirable to create optimal conditions for this bug.

Key words: Ecological management, natural enemies, shield-backed bug, strip agriculture, wheat
IR spectroscopy in white rot decayed beech

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Small steaks of beech wood were exposed to white rot fungus (*Trametes versicolor*) for a period of 84 days to investigate chemical alteration in decayed wood by Infra Red (IR) spectroscopy. Decayed samples were analyzed by using Attenuated Total Reflection (ATR) Infrared Spectroscopy as a rapid method with two-week intervals. Analyses showed that chemical alteration in wood begins after second week of exposure. Appearing new peaks indicates chemical modification of cell walls during days 28 to 70 of exposing to fungus and disappearance of the peaks at day 84 indicates removal of the cell wall constituents. This research also showed that ATR spectroscopy is a very applicable and rapid method in studying wood biodegradation.

Key words: Infrared spectroscopy, white-rot decay, *Trametes versicolor*

Study of relation between vegetation cover, soil and geomorphologic factors in Kasilian watershed using GIS

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This research carried out with a view to define correlation between vegetation, soil and geomorphologic units in Kasilian Watershed rangelands located in Mazandaran. Frequently 39 land units were selected from overlaying slope, aspect, height and geology maps using Geographical Information Systems (GIS) as a foundation of sampling of soil and vegetation. Soil factors such as N, P, organic materials, structure, pH, and EC were determined. Then plant cover parameters (canopy and density) measured for some species. Percentage of canopy cover in related to studied species in different land units showed a significant difference. Using correlation method, one-way ANOVA, multiple ranges Duncan test, independent-samples T test and Kruskal-Wallis non-parametric test, the effects of geomorphological factors on
vegetation parameters was studied and showed that variation in percentage of canopy cover and density of the species are influenced by aspect and geology. Unlike to other geomorphologic factors, however, slope and height had no correlation with vegetation parameters. The effects of soil factors on plants species were not the same. Phosphorous, clay, pH, and EC were more effective than the other soil factors but the correlations between N, K, sand and organic materials with soil density were negligible. Percentage of canopy cover showed no significant difference.

Key words: Plant cover, plant density, soil, geomorphologic units, range species, geographical information systems (GIS), Kasilian, Iran.

Study of water stress effects in different growth stages on yield and yield components of different rice (*Oryza sativa* L.) cultivars

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Water stress affects plant growth and development and ultimately, reduced grain yield of irrigated lowland rice. A field experiment conducted at Rice Research Institute of Iran, near Amol in Mazandaran province during 2001-2003 to evaluate the effect of water stress on the yield and yield components of four rice cultivars commonly grown in Mazandaran province, Iran. The cultivars used were Tarom, Khazar, Fajr and Nemat. Different water stress conditions were water stress during vegetative, flowering and grain filling stages and well-watered plants were considered as the control. Results showed that water stress at vegetative stage significantly reduced plant height of all cultivars. Water stress at flowering stage had a greater grain yield reduction in compare to other water stress conditions. Hence, the reduction of grain yield of these genotypes was largely resulted from the reduction in fertile panicle and percentage of filled grains. Water deficit during vegetative, flowering and grain filling stages reduced mean grain yield by 21%, 50% and 21% on average in comparison to control respectively.

Key words: Rice, yield, growth, water stress, grain filling, flowering
The study of dry matter and nitrogen remobilization in different rice cultivars under water stress conditions

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In order to study dry matter and nitrogen remobilization in different rice cultivars under water stress conditions, an experiment was conducted at rice research institute of Iran, near Amol in Mazandaran province during 2001-2003. A split factorial experiment based on complete randomized block design in three replications was conducted. Main plots included drought stress in four levels (continuous irrigation or no water stress as a control, drought stress in vegetation, flowering and grain filling phases) and cultivars in four level (Tarom, Khazar, Fajr and Nemat) with nitrogen fertilizer in two levels (92 kg n. ha⁻¹ and 115 kg n. ha⁻¹) were arranged in sub plots. Results showed that dry matter remobilization portion in grain yield ranged from 9.2 to 28.6 percent in different genotypes.

Different genotypes had different nitrogen remobilization, so that in terms of stem and other leaves nitrogen remobilization Tarom cultivar, in terms of flag leaf remobilization, Nemat cultivar and in terms of shoot nitrogen remobilization Tarom cultivar had relative advantage to other genotypes. There were significant differences among different drought stress treatments in terms of dry matter remobilization portion in grain yield, so that the highest amount were related to drought stress in flowering phases. A significantly positive correlation was observed among grain and stem yield, flag leaf, common leaves, and total shoot dry matter as well as nitrogen remobilization.

Key words: Rice, water stress, yield, remobilization and nitrogen
Determination of effective factors on oak sprouting in different slope aspects in northern Zagros forests of Iran

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This research was carried out in the Doveyse forest with an area of 660 hectare, located in northeast of Marivan, Kurdistan province. 103 plots (150×300m) were taken using a systematic random rectangular grid. Quantitative parameters of oak stands, coppicing situation of oaks and plant cover were noted in the plots. Based on plant ecological groups' map and physiographical factors, site homogeneous units were determined then soil and litter samples were gathered from these units. The effect of physiographical factors including altitude, slope aspect and slope percent, some of the most important edaphic factors (totally 19 factors) and quantitative parameters of oak stands (totally 15 parameters) were analyzed using PCA statistical method.

The results showed that the most important factors affecting non-coppicing of oak manna tree (Quercus persica) were the pest damage and grazing. Phosphorous content of litter was the most effective factor in non-coppicing of gall oak (Q. infectoria) and coppicing of Lebanon oak (Q. libani) strongly affected by soil and litter pH. Coppicing of gall oak and Lebanon oak decreased with altitude increase.

Key words: Coppice shoots, Marivan, oak, PCA, physiography, soil

Sunflower spring-planting yield as affected by plant density and cultivar in ShahreKord region

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Sunflower (Helianthus annuus L.) is a major oilseed crop in Iran with an average area of nearly 100,000 ha. In order to study the effects of
genotype cultivars and plant density on seed yield and agronomic characteristics of sunflower, an experiment was conducted at the research farm, College of Agriculture, ShahreKord University, ShahreKord, Iran in 2002-2003. Four plant density and three cultivars (Azargol, Armavirsky & Zaria) were used under a factorial experiment using a randomized complete block design with four replicates. The seeds were drilled in plots at row distances of 60 cm apart in different row intervals (15, 18, 21 and 24 cm). The results indicated that there was no significant difference between the head diameter, head yield and grain yield of cultivars but seed oil percentage, seed number per head, plant height, one thousand grain weight and oil yield were affected by cultivars significantly. Zaria had the least (45.2%) and Azargol had the highest (47.2%) oil percentage between cultivars. Azargol had the highest oil yield (1330 kg ha$^{-1}$) between cultivars. Zaria had the least (44.7 gr) and Azargol had the highest (52.3 gr) one thousand grain weight. Plant population had no outstanding effect on plant height, head diameter, head yield, seed number per head and 1000-grain weight but increase in plant density led to a higher seed oil percentage, grain yield and oil yield.

Oil percentage, grain and oil yield were affected by plant density significantly. Increase in plant population caused an increased oil percentage, grain yield and oil yield. The results of this study revealed the necessity of conducting comprehensive studies to increase grain quality and quantity of sunflower.

Key words: Cultivar, plant density, sunflower, yield and yield components

**Study of the effects of lignosulfonate on applicational properties of wood cement panels**

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In this study, wood particles were prepared from a mixture of species and Portland cement 500 as well as catalysts CaCl$_2$, lignosulfonate (ph=5) were used. The pattern of sample cutting and their physical and mechanical properties (including swelling after 24 hours soaking in water, bending strength and internal bond quality) have been investigated according to GOST 26816-86 “Bonded Wood-Based Panels”.
The results obtained from the effects of liquid lignosulfonate at the time of cement hardening indicated that with the increase of density of liquid lignosulfonate to 1%, time of cement hardening increased and then decreased. The results concerning the effect of lignosulfonate on quality characteristics of wood cement panels showed that using liquid lignosulfonate with 1% density in the manufacture of wood – cement panels improved internal bond quality and did not change in bending strength. Also the use of lignosulfonate increased the thickness of swelling after hours of soaking in water, so use of 1% of lignosulfonate was recommended in the solution to meet standard.

Key words: Cement board, lignosulfonate, thickness swelling, bending strength, internal bond, cement hardening.

**Introduction of flora, life form and plant geographical distribution of oriental Beech (Fagus orientalis Lipsky) stands in Vaz forests**

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The floristic-physiognomic investigation for 4th seasonal sequence was performed in an oriental beech (Fagus orientalis Lipsky) forest in Vaz in 2002. The forest was located in southern slope of Chamestan at Noor in the Mazandaran province, north of Iran. Flora of this region includes 110 species consisting 103 genera and 59 families. Families with greatest representation by individual taxon were Rosaceae (12 taxa), Labiatae (8 taxa), Compositae (6 taxa), Papillionaceae (4 taxa), Solanaceae (4 taxa), and Gramineae (3 taxa).
Life form of species, on the basis of Runkaier classification were dominated by Hemicryptophytes and Phanerophytes and according to Suzuki-Aracane sub-classification were dominated by single stem Hemicryptophytes (HC) and Deciduous trees (DML). From viewpoint of the plant geography, this region includes 29% Europe-Siberian, 13% Poly-regional (Europe- Siberian, Irano-Touranian, Mediterranean, Pontic and Irano-Anatoli), 12% Euxino- Hyrcanian, 9.5% Hyrcanian, 7.6% Euro-Siberian-Mediterranean-IranoTuranian, 5.7% Irano-Touranian, 5.7%Euro-Siberian-Mediterranean, 4.8%Euro-Siberian-IranoTuranian and 13.7% other bi-or tri-regional elements.

Key words: Oriental beech (Fagus orientalis Lipsky), flora, plant geography, life form, vascular plants, Hyrcanian forests, Vaz, Iran.

Grazing impacts on infiltration rate in a part of Alborz mountainous rangelands, Iran

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Grazing may affect on some of the physical characteristics of soil out of which the infiltration is one of the most important ones. The Lar area which is located in the southern skirt of the Alborz Mountain range is mainly covered by summer rangelands. To understand the role of grazing on infiltration rate, three level of grazing viz. light, moderate and heavy were selected in the study area. The infiltration rates were measured with the help of double cylinder infiltrometer. The results of the study depicted that as infiltration curves revealed the meaningful difference among treatments, the infiltration velocity was the highest and the lowest in light and heavy grazing areas respectively.

Key words: Alborz mountainous rangelands, grazing, infiltration, Iran
Ecology of halophytes in salty lands of Khorasan
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Arid regions of Khorassan province mostly include salty lands (Kavir) that receive less than 150 millimeters of rainfall annually. Dryness and saltiness conditions have caused special situation for growing plants, which named halophytes. This study was carried out in order to determine the region territory and identification of the vegetation.

Method of study was to investigate plants and soil samples of the field for collecting data and identifying samples in laboratory. Results indicate that the salty regions have a characteristic and uniform feature so that depending on general topographic conditions, there are several belts of halophyte plant types and societies around salty center of the regions that in turn, depending on microclimates and microtopography there are changes and gaps along the belts. Therefore the vegetation is completely related to geomorphology, soil type and level of underground water.

In most salty zones of khorassan, common specification of these societies are as following: The salty center (where the water table reaches the surface) is mostly bare and has not any vegetation because the soil is very salty. The first belt outward salty center usually has only one species *Halocnemum strobilaceum* or occasionally together with *Halostachys belangeriana* and *Tamarix spp.* (Kal-e-Shoure Sabzevar). In the latest belts depending on distance of the center and water table depth, gradually, numbers of plant species are increased and also, halophytes depending on salt-tolerance are added to the vegetation cover. Afterward, the halophytic species having less salt tolerance were appeared such as *Aeluropus littoralis, Alhagi camelorum* and *Limonium Iranicum*. Finally, the belts are ended to the plant types including non-halophyt plants.
Plant species of *Seidlitzia rosmarinus*, *Salsola arbusculiformis* and *Reaumuria alternifolia* are formed in certain types together with species of *Asteragalus squarosus* and *Limonium Iranica*. Sometimes, it is seen that some freshwater flows accrued into salty zones, which cause to establish plants with some what tolerance to salinity such as *Artemisia santolina* and *A. sieberi*.

Key words: Salinity, halophytes, *Halocnemum strobilaceum*, *Seidlitzia rosmarinus*, *Aeluropus littoralis*, *Alhagi camelorum*, *Limonium Iranicum*. Kal-e-Shoure Sabzevar, Kavir-e- Namak

**Effect of wastewater treatment reuse on Agricultural crops in Hovaizeh**

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Wastewater reclamation and reuse is one of the best alternatives for compensating water shortage. It meets two purposes: Supplying of water, environmental conservation. Principally, treated wastewater is a reliable water source even periodic droughts and in arid area. This study designed and implemented to surveying application of effluent in full scale. A major objective of this study was assessment, safety and feasibility of crop irrigation by using stabilization ponds effluent in southern Hovaizeh located in Khozestan province. Two experimental plots constructed. The area of a plot was about 0.5 ha. One of the plots irrigated by stabilization pond effluent, another one is irrigated by Nissan river water. Basic parameters in two plots such as type of cultivated crops, amount of fertilizer, Lack of soil contamination have been similar to each other. The only difference as mentioned formerly has been type of water applied for irrigation agricultural crops.

It was shown that high Salinity of soil reduce growth rate of agricultural crops. So, removing salinity from area soil should be performed before cultivation. Agricultural crop growth data in two testing plot showed that growth rate and quality crops are increased by using of stabilization pond effluent in comparing with Nissan river water.

Key words: Reuse, experimental plot, effluent, stabilization pond, agricultural crops
Phosphorous loss in forest area

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Soil top surface or productive layer is become out of plant accessibility by erosion. In past years there have been focused only on soil loss and its transition from catchments and plots. Simultaneously, soil nutrients loss in forest area in spite of its importance, has not been investigated enough which, is the main target of this research.

In this research, runoff and sediment from three plots (10×10 m\textsuperscript{2}) were measured during four years. Then samples have been analyzed for measuring phosphorous and some others nutrients. These minerals have also measured in five layers (0-10, 10-20, 20-30, 30-40, 40-50 cm) to analysis soil nutrient loss during research period.

Results showed a value of 724.570 ppm/ha for phosphorous in runoff water and sediment during 40 months. There were not observed any significant changes between plots based on runoff analysis. Comparison of samples in different soil depths did not show any significant change in phosphorous amount in different plots for each depth. But there were significant variation in nutrient measure between adjacent depths in a plot in the whole soil profile.

Results showed that soil phosphorous loss from forest area is very low. Based on the results of this research and other experiences, there is a high risk of land use changing in forest areas due to improper management, when compares with other land uses.

Key words: Phosphorous, soil nutrients loss, forest soil, Kasilian

Biological combating desertification by means of

\textit{Holoxylon percicum}

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“Desertification” has been recognized as a worldwide problem. The situation in Iran provides a clear example, so a scientific and legal
work for sustainable use of desert soils and combating desertification is necessary.

The study area with a total surface area of about 1100 km$^2$ lies in the west margin of Kavir-e-Abarkooh at 53° 20’ and 53° 30’ E longitude and 30° 50’ and 31° 15’ N latitude.

The soil map was prepared by aerial photo interpretation, overlying topographic and geological map and checking in the field. After the selection of transects from all profiles around which *Holoxylon persicum* is planted eight sites are selected and the height and diameter of plants or the canopy cover are used as an index for plant performance. Soil samples were taken at the depths of 0-30, 30-60, 60-100 and 100-120 cm.

For statistical analysis SYSTAT software was employed. The relationship between performance (height × diameter) of species as a dependent parameter and soil characteristics as independent parameters were analyzed. Using forward stepwise multiple regression from different parameters (soil attributes), it was shown that only the percentage of sand has a positive effect on performance of *Holoxylon persicum* with a probability of 95%.

The ALES Land Evaluation computer program was used to determine the land suitability table for *Holoxylon persicum* and by using ILWIS software land suitability map for *Holoxylon persicum* was presented.

Key words: Desert, combating desertification, Abarkooh, Kavir-e-Abarkooh, *Holoxylon*

**Alborz Mountain the southernmost habitat of silver birch species in the globe**

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There are about 60 species from birch genus in the world which all distributed in arctic and subarctic as well as cold mountains of temperate regions of North hemisphere. All these species are tree or shrub as dominant species in some places in boreal biome. In Iran only one birch species (*Betula pendula* Roth) found in high altitudes of Alborz Mountain especially in Sangdeh and Lar regions in Mazandaran province as its latest habitat.
By the aid of TWINSPAN (Two Way Indicator Species Analyses) method we found 9 indicator species in two ecological groups. The first group with indicator species of *Cotonaster nummularioides* was the indicator of poor and calcic habitats. The second group with indicator species of *Actaea spicata* was the indicator of acidic and rich habitats. Principal Component Analyses (PCA) ordination carried out for sample areas and species. These analyses showed five ecological groups which segregated due to differences with each other; each group poses some sample areas with the highest floristic similarities.

Key words: Birch, Alborz Mountain, ecological species group, PCA, TWINSPAN

**Effects of A-8 insecticide on Earthworms (Eisenia foetida)**

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The employment of intensive crop production technologies in agriculture includes the application of mineral and organic fertilizers and pesticides, crop treatment with biologically active substances and the use of such chemicals of plant protection for pest and disease control as herbicides, fungicides, insecticides, and acaricides. As modern science considers the soil as a living or endowed with life planetary system which can accumulate and transform the above listed substances, it becomes evident that ecotoxicological evaluation of their effects on soil biota is a must in every concrete case of their use. It is important to elucidate how they affect the organisms composing agrocaenoses, particularly the earthworms famous for their useful role in soil formation.

The aim of this work was to investigate the influence of A-8 insecticide on *Eisenia foetida* worms. We used artificial soil substratum to perform the tests. In agreement with this method, to determine the acute toxicity of A-8 insecticide, the adult worms were kept in artificial soil substratum treated with tested preparation in varying concentrations. The death rate of test-objects was the essential criterion of insecticide.

Research results showed that A-8 insecticide to be nontoxic to the animals in concentrations within 0.1-1 mg per kg of dry substratum (p>0.05). LC100 of a preparation was registered at 100 mg per kg of
substratum and LC50 - at 6.5 mg/kg. LC0 was established for the insecticide concentration of 1 mg/kg.
Considering the rate of insecticide application (0.2 l/ha), its absorption by the leaves, and uniform distribution of the material in the soil, one can come to conclusion that the concentrations used for the treatments are by 1-2 orders lower that those which may be toxic for the *Eisenia foetida* earthworms.

Key words: Earthworms; *Eisenia foetida*, insecticides, artificial soil test, toxicity

### Study of leaf and root of healthy and unhealthy beech (*Fagus orientalis*)

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In order to investigate beech forest decline, three homogenous stands were selected in northern forests of Iran. For this intention, 28 healthy and unhealthy beech trees were selected and some of their leaves were taken from the middle parts of crown. The leaf samples were analyzed to determine the macro (N, P, K, Ca, and Mg) and micro (Fe, Mn, Zn, Cu, and Br) nutrient elements. The roots of 22 healthy and unhealthy beeches (d.b.h. < 10 cm), excavated in a volume of 1m³ soil located under the tree crown, were selected to examine the dry weight.

The results showed that the amount of N, P, K, Br and Cu were lower in unhealthy trees but the deficiency was not high enough to influence on beech mortality. There was no deficiency in other elements. Mean dry weight of roots (per 1 m³ soil) in healthy and unhealthy trees was 12 and 9.9 kg, respectively. A negative significant correlation was found between crown wilting and root dry weight (R = 96%).

Key words: Leaf, root, unhealthy trees, beech, *Fagus orientalis*
The study data on the impact of up-to-date biological preparations on the germinating capacity and development of seedlings of *Picea abies*

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A new biological preparation complex “Micol”, as well as two growth promoters “Gibbersib” and “Natrium gummate” has been tasted to minimize losses in forest nurseries caused by a number of diseases. Results allowed us to recommend these compaunds for the use in forest nurseries for the growth of pine and spruce seedlings.

Key words: Seed germination, young seedlings, pine, spruce, forest nursery, protection.

Dynamics of tree attrition of spruce stands in Moscow region

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Attrition is referred to trees, which died as a result of natural density decrease. The article is devoted to studying dynamics of number and stock attrition in spruce stands in Moscow Region. This work used the results of the research that has been carried out by Forest Inventory and Protection Department, MSFU, on 6 permanent plots starting from 1954.

Distribution character of number and stock attrition on natural diameter classes, change of attrition intensity and dependence of percentage of the annual tree number attrition and stock attrition on the age of stands were revealed in the given forest stands. Variation of the tree number and stock attrition on natural diameter classes and age
statistically was similar. Models were developed for predicting number and stock attrition.

Key words: attrition, distribution, natural diameter classes, permanent plots, stand dynamics, spruce, tree number and stock,

**Study of effects of time and temperature on *Eurotia ceratoides* germination**

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Conservation and protection of range species especially for key species and palatable is inevitable for improvement and development of rangelands. One of the successful projects in range improvement and development is applying seeding methods. Having technologic knowledge in relation to temperature and appropriate time of storage in barn and its relation to germination capacity maintenance is very importance. It is mentioned that the best temperature for determination of germination capacity of *Eurotia ceratoides* is 30°C within average 5.25 days. The best method in establishing a successful planting has been mentioned to be successive plowing, disking, hole making and seeding. Mid December and mid January are known as the best time to obtain a well established plantation. After gathering seeds within the site and separating litters and defect seeds they are kept in oven at a temperature 30 °C and when their moisture content was about 7-8 percent we have taken them out. Then the seeds were randomly planted in 44 closed containers, 150 each, and cultivated at four temperature treatments 0-5, 5-10, 15, 20 °C in four replications. We put each of the eleven containers in separate storage areas in germinator machine to measure the germination capacity. Results showed that all the temperatures had a significant difference at 1% error level and maximum ratio of germination achieves at 0-5 °C during 9 months. An interaction between temperature and time of storage showed that the storage of seeds up to 9 months in temperatures of 0-5 and 5-10 °C caused a germination increase in first place that followed with a decrease in germination percentage afterward. But temperature treatments of 15 and 20 °C with an increase in time of storage decreased the germination of *Eurotia ceratoides*. It seems that temperature is one of the factors that decrease dormancy period but this factor in short time has a severe effect on the
germination capacity of *Eurotia ceratoides*. Seeds of *Eurotia ceratoides* can maintain more than 50% of their germination capacity at temperatures of 0-5 and 5-10 °C during 2 years.

Key words: *Eurotia*, germination, range, seeding

**Etiology of wilting branch of olive trees in gardens**

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The wilting of olive branch in nursery and newly established orchards was studied in three provinces including Zanjan, Golestan and Khorasan in Iran. Different infested plants in studied areas were visited and samples showing symptoms including wilting or death of branches were collected and transferred to laboratory. Samples were cultured in common media and distinguished fungi were identified. The most frequently isolated pathogen was *Verticillium dahliae*, which caused wilting of commonly one branch of olive seedling or trees and resulting severe damage in studied areas. Results showed that the disease caused main losses where olive cuttings were cultured in infested soils, previously cropped to other susceptible plants. In fact, the population density of *V. dahliae* was high in the soil that previously produced sensitive crop cultivar to the fungus especially cotton or potato. Using traditional cultivars of olive in Iran allowed the distribution of wilt disease in the countryside. The pathogen is soil-borne fungus, which survives in soil for long times and causes the high disease on olive plants.

Key words: Olive, wilting, *Verticillium dahliae*, Iran

**Hyper-accumulation of heavy metals by some crop species and the feasibility for using in phyto-remediation**

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Contamination of heavy metals in the environment is one of the major concerns because of their toxicity and treats to human life and the
environment. Phyto-remediation, using plants to remediate contaminated soils is an emerging technology. In this work, in order to find suitable plant species for using in cleaning up the soils, some crop species were studied in the presence of various concentrations of six important heavy metals including Cd, Cr, Co, Ni, Cu and Mn. The growth and accumulation of metals were studied in five crop species including two cultivars of wheat, bean and alfalfa for Cd, Cr, Co and Ni, and rice, maize and sunflower for Cu and Mn. Experiments were carried out using hydroponic culture media under controlled environmental conditions. Because of different growth responses to high metal concentrations depending on species, the accumulation of metals was not reliable for evaluating the potential of a given species for using in phyto-remediation. Therefore, in addition of bioaccumulation coefficient, %recovery of each heavy metal in shoot and root of studied plants were also calculated. Taking into account the biomass, metal content as well as %recovery values together, it was concluded that bean is the most effective crop in removing Cd, Cr, Co and Ni from medium.

This crop species recovered up to 50% of Ni supply of medium in shoots and roots and up to 25% of Cd in roots and 15% in shoots. For Cu, a great bioaccumulation coefficient and also a high %recovery was observed in rice. This plant, demonstrated a high Cu tolerance which was associated with a high metal accumulation in both shoots and roots, giving raise a recovery as high as 74%. For Mn, in contrast, a high bio-accumulation and %recovery especially in shoots was detected in sunflower. Interestingly, in maize, though a low uptake and accumulation, a high susceptibility to heavy metals was observed. In conclusion, assuming the biomass production under toxicity conditions which is attainable for bean, rice and sunflower, and also the corresponding bio-accumulation factors, it is possible to achieve a halving of soil metals in fewer than five crops.

Key words: Alfalfa, bean, heavy metals, maize, phyto-remediation, rice, sunflower, wheat
Evaluation of plastic mulch effects on cucumber and tomato yields at flowering and production stages

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Plastic mulch is one of the effective ways to conserve water in the soil reservoir to be taken in gradually by plants. Combination of plastic mulch and drip irrigation was popularized in the United State for more than two decades and recently in some parts of Iran, due to “quicker to market”, benefit of faster seed germination and plant growth. However, the combination of plastic and furrow irrigation has not yet been fully examined in the field to find if there is any effect on soil water conservation and probability of increase in yield. The purpose of this study is to find the effect of plastic mulch use with furrow irrigation on cucumber and tomato yield in the field at flowering and production stages. For this purpose, a series of experiments were performed in a field in city of NajafAbad, Isfahan province, Iran. Experimental layout consisted of three treatments, say furrows without mulch, furrows conjunction with opaque (or clear) plastic mulch and furrows conjunction with black plastic mulch for both cucumber and tomato independently.

Each treatment was replicated three times. The soil moisture content was monitored during the season and crops yield were estimated and the results were compared to control (furrows without plastic mulch). Overall, there was a significant difference in soil moisture retention between clear plastic and control and also between yields resulted from furrows with clear and black and without plastic mulches for both cucumber and tomato crops. Statistical method was considered for data analysis in this study.

Key words: Cucumber, furrow irrigation, plastic mulch, soil moisture, tomato, yield
Redescription of the Pigeon pea Cyst Nematode, *Heterodera cajani*

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Cyst forming nematodes are a major group of plant pathogens with economic importance in many countries all around the world and considerable yield losses have been attributed to them attacking potato, sugar beet, cereals and pulses. Some of the cyst nematode species have been completely morphologically studied, but number of others await full taxonomic study and description. Soil samples collected from the infested pigeon pea field, air dried and *Heterodera cajani* cysts extracted by Fenwick can method. Freshly isolated cysts crushed and second stage juveniles and eggs obtained and vulval cone prepared from the cyst mounted in glycerin gel. All the measurements were taken with an ocular micrometer, drawing with the help of camera lucida. Cysts are lemon-shaped, ambi-fenestrate and encircled by more or less circular basin, 6-13 µm wide; 6-9 µm vulval bridge with 31-46 µm long vulval slit. Each semi-fenestrate has a 31-48 µm long and 22-41 µm wide. Underbridge well developed with a 42-58 µm long and 11-16 µm wide. Bullae present, peripheral and may present at different levels.

In this communication, second stage juvenile, cyst and eggs of the pigeon pea cyst nematode, *Heterodera cajani* Koshy, 1967 have been measured, drawn, micro-photographed and redescribed.

Key words: Cyst nematode, description, *Heterodera cajani*, taxonomy

Effect of planting date on the yield of promising sorghum lines in Shahrekord region

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To determine the best planting date for two improved and four promising sorghum lines, an experiment was conducted in the form of split plot design with 3 replications. Three planting date, 10th May, 26th May and 10th June and six lines were considered as main and sub
plots respectively. The results indicated that planting date did not affect plant height, number of leaves, and days to flowering, but it affected spike length, spike weight, grain weight per spike, 1000 grain weight, number of tillers per m² and yield per m² significantly. The interaction effect between line and planting date was significant at 5% error level for number of leaves and spike length, and at 1% error level for other trails. Plants which had the highest spike length, highest spike weight and highest 1000 grain weight were those had been sown at 10th May. The highest yield and maximum number of tillers were obtained from plants had been sown at 26th May. Days to flowering was highest for lines had been sown at 10th June. In general, the best planting date was determined to be May the 10th.

Key words: sorghum, planting date, yield

The transfer or substitute model for the polluted air in Tehran

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This study proposes a mathematical model of air changes and static state with respect to the geographic situation of Tehran and the air blow direction that causes substitution and change in the air of this city. The paper also presents the geographic specifications of Tehran and the amount of pollutants; however, unfortunately, compared to the pollutants quantity in two large Russian cities- Moscow and Saint Petersburg, their amount are ten times bigger. The differential equation that governs diffusion of polluted air in Tehran has been proposed and due to the trivial substitution and diffusion of air in the vertical axis, the equation has been taken in b-dimensional form.

Key words: Air pollution, mathematical model, air change, wind direction, Tehran
Range dissemination using motorcycle seeder

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Overgrazing is depleting the rangelands, which is very dangerous for the ecology. On the other hand, keeping a suitable balance between the range cover and the flocks of goats or sheep and herds of cattle is very important in managing the ecosystem balance which is possible by scattering and disseminating different plant species and seed disbursal all over rangeland. The traditional expensive and heavy seeders such as airplanes and tractors can not achieve this important task due to economic and technical reasons. Considering the cost, drift, uniformity of seed distribution, soil compaction and rangeland higher slopes, the newly designed and developed idea of motorcycle seeder is superior to the traditional seeders. The speed and accuracy of motorcycle seeder is much higher than the manual scattering of the seeds which is tedious.

The motorcycle extra power has been engaged in this seeder which operates a blower. The blower transfers the seeds from hopper metering unit to the distributor hoses installed at motorcycle carrier. The motorcycle seeder is therefore more efficient, cost effective and environmentally friendly for the range dissemination.

Key words: Seeder, motorcycle seeder, small range seeds, range dissemination

Design of forest tree cutting mechanisms

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In spite of mechanized harvesting methods of the poplar trees in the world, the method of felling and harvesting them in Iran is however carried out manually and is still in rudimentary stages and has not been mechanized yet. Considering the technical and scientific advancement of the harvesting and processing tools in industrial countries and also the significance of the wood in the modern human life, and importance of poplar trees, the design of this mechanisms were carried out in a research work which is presented in this paper. These mechanisms include the systems for cutting and felling of green forest tree branches
that work mostly hydraulically. The maximum possible weight of a
tree has been experimentally determined. The forces required to cut
branches have also been determined with the help of experimental data
and initial dimensional information. The geometric shape of cutting
blades has been designed to have optimum efficiency and high quality
of the cutting operations. The simplicity and ease of manufacturing and
assembling the parts indigenously were kept in mind during the design
process. The whole system is an advanced tool in afforestation and
modern poplar tree cutting and processing.

Key words: Forest trees, cutting mechanism, fixed blade, movable blades

Bio-fuels: past, present and future perspective

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The history of alternative energy sources is worthy of study from many
points of view. The research into some of the roads not taken so far
would provide the history with better focus and broader perspective.
Basically bio-fuels are liquid and gaseous fuels produced from biomass
feedstock via a number of well understood biochemical processes,
using proven techniques. The two bio-fuels that have advanced the
most are bio-diesel produced from vegetable oil and bio-ethanol
produced from plant sugars. Typical feedstocks for bio-fuels are
agricultural crops such as oilseed rape, sunflower, wheat, sugar beet
and sweet sorghum. Results of the investigations showed that bio-fuels
have the potential of supplying some of the energy need by agricultural
areas. The most important advantage of these fuels is that, they are
renewable energy sources compared to the limited resources of
petroleum and have the potential to reduce the level of pollution and
global warming. The alternative bio-fuels must be technically
acceptable, economically competitive, environmentally reasonable and
easily available.

Some countries in the world have launched a full bio-fuel research
program, development and demonstration up to the point of
deployment while some others have not registered full deployment yet.
Among the different countries, Brazil is the world leader in the
production of bio-fuel with 45% of the national total fuel consumption,
followed by the USA and then France. Investigations show that there is
a very attractive technology potential for bio-fuel 12% market share by the year 2020 in the world. Despite of a promising outlook, bio-fuel investigation and production is still in its rudimentary stage in Iran.

Key words: Bio-diesel, bio-ethanol, bio-fuel, bio-methanol, future fuel, liquid bio-fuel

Identification of some nematodes species from Chaharmahal-va-Bakhtiyari, central province of Iran

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Plant parasitic nematodes decrease the yield of forage crops all over the world every year. Therefore we studied the nematodes fauna of forage crop (alfalfa, clover and sainfoin) on 60 collected soil samples in Chaharmahal-va-Bakhtiari province, in 1998. The samples were processed in the laboratory and the nematodes extracted by De Grisse (1969) method. About 800 permanent slides of nematodes were prepared for morphological and morpho-metrical studies. Selected nematodes slides were carefully observed by light microscope and compared with diagnostic keys.

In this work 13 species from 9 genera were identified. The species, *Paratylenchus italiensis* and *Stictylus intermedius* was reported for the first time from Iran.

Key words: Plant parasitic nematodes, forage crops, fauna, Chaharmahal-va-Bakhtiari, Iran.
Increasing the competency of farmers and land users as a critical future force for agricultural development and natural resources, Isfahan, Iran

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According to various studies, agricultural development in Iran has yet not had any convincible evolution. Consequently, more than 50% of total available land, water, and natural resources have still not been cultivated. On the other hand farmers and land users have not treated friendly and appropriately with these valuable natural resources as expected. Several statistical reports have already stressed this fact. Consequently, a large part of pastures and grasslands has been lost their productivity and potentiality because of overusing and inappropriate exploitation. Hence, a number of researchers believe that the difficulties within Iranian agriculture have resulted from inefficient resource used by human within the sector, rather than a resource squeeze from agriculture. Therefore, more consideration to human resources in agricultural sector is inevitable. Since farmers and land users are the main factors of active human resources in the agricultural sector, increasing their competency and skills directly influence efficiency and productivity of agriculture and natural resources.

In this contribution attention is being paid to the changes that farmers and land users have been experiencing from last decade till now. Likewise, coping strategies they have applied to overcome these changes and their competency situation are considered and discussed. What competencies they do have, what they should posses and the extent to which they need to be equipped with these necessary competencies. Finally, recommendations are also presented and discussed.

Key words: Agriculture, competency, development, farmers, land users, natural resources
Training agricultural managers for sustainable economy

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Modern trends in global development endorse new imperatives on education for leaders of agriculture. On one hand, there is a need in high level industrialization of agricultural production to fulfill growing demand. One another hand, we have limited agro-biological potential of the planet. Reckless exploitation of the resources, according to research, will impact irreversible exhaustion of the agro- and bio-resources during lifetime of a few generations. The solution of the dilemma lays in modern technologies. That is why the importance of teaching modern technologies for economists and managers of agricultural industries is growing. Teaching the course “Theoretical Foundations of Modern Technologies” at the Moscow State Agricultural Timiryazev Academy by the author is discussed.

Key words: Sustainable development, modern education, progressive technologies

Macro mineral status of some permanent range plants for grazing sheep in semi-arid areas of Chaharmahal-va-Bakhtiyari province

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The study was performed in order to understand mineral content of dominant range plants (Gramineae, Leguminosae, Compositae, Rosaceae and Umbeliferae) in semi-arid areas of Chaharmahal-va-Bakhtiyari province in Iran. Samples were taken between 36 - 60 replications for each individual species from five main non-grazed areas of the province including Shahrekord, Farsan, Brojen, Lordegan and Ardal during three stages of phenology including growing, blooming, and seedling between 1997-2000 years. An analysis of the whole plants revealed that the content of magnesium for Agropyron intermedium, Bromus tomentellus and Hordeum bulbosua in the three growth stages were lower than the critical value required for ruminant (P<0.05). Sodium content in all species were lower than the critical value (P<0.05). Phosphorous content of Agropyron intermedium,
Bromus tomentellus, Cosina bakhtiariaka, Scariolla orientalis and Astragalus spp. was lower than the critical value (P<0.05). Data obtained from whole plant samples suggested that semi-arid rangelands of Chaharmahal-va-Bakhtiyari province require mineral supplementation especially three elements of magnesium sodium and phosphorous for grazing sheep.

Key words: Macro mineral, herbage, Chaharmahal-va-Bakhtiyari, Iran

Investigation of effective parameters on growing of three kinds of grass in spring planting and no tillage system using mulch-planter

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Attention to developing the pasture, soil conservation and make a potential to increase the soil infiltration using the applicable methods to benefit of the agricultural machinery and no tillage system especially are very important. In this regard, the husk properties as herbal mulch, and also the physical properties of species Secale montanum, Festuca arundinacea and Bromus tomentellus were studied.

An instrument was designed and then constructed, so that it could simply place a bond of mulch into the soil. Also planting seeds for developing of pasture could provide an appropriate seed bed in the soil. In the present study, factors of three kinds of species, three amounts of mulch, and two depths of seed planting were examined. The results showed that the agronomic operations and application of mulch-planter with no tillage practices are very effective. At last, analysis of the data including number of growing plants showed that there were significant differences among the factors. Use of mulch on species of Secale montanum seemed to be not advisable.

Key words: Mulch-planter, husk, grass, pasture
An assessment of wood properties interactions of *Eucalyptus camaldulensis* in papermaking

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In this study, a wood properties relationship of *Eucalyptus camaldulensis* was investigated as a suitable fast growing tree for papermaking in Iran. Cross sectional disks were cut at breast height from three 17-years-old trees grown in Pasand research station in Mazandaran province, Iran. The rate of increase in growth-ring width was significantly higher during the first 4 years of growth. This however decreased gradually in the following years. Growth-ring average was 5.6 mm. Increasing growth rate on initial growing years of *E. camaldulensis* may be attributed to higher cambium activity during this period. The fiber dimensions increased gradually with age rise. The cell wall thickness and fiber length had the highest variations, respectively. There were significant variations in fiber length among individual trees and the rings.

*E. camaldulensis* is classified as short fiber hardwood based on fiber length aspect and it is necessary to add long fiber pulp to provide optimal strength in papers made of this species. In general, wood density values increased with age increase. Values ranged from a low of 0.49 to a high of 0.60 g/m³ for basic density. Regression analysis among fiber dimensions, density and growth-ring showed a significant positive correlation between fiber dimensions and density with aging. Also there was strong correlation between cell wall thickness and density. There is possibility to increase growth rate through biotechnological approaches without any significant variation in fiber dimension and wood density.

Key words: *Eucalyptus camaldulensis*, papermaking, growth rate, ring width, fiber dimension, density, chemical composition
The comparison between lateral shear strength of some kinds of screw, dowel and metal corner joints in MDF

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This study have been conducted to find the best form of joints which are used in the wooden sheets (such as book cases, cabinets) from the lateral shear strength point of view. The joints were dowel joints in 8, 10 mm diameters within flat surfaces and those are soaked in PVA or UF resins and types of metal corner form as well as screws with or without resin. The number of the above joints was 20 types that we made 5 T-form of each type and have measured their resistance over the lateral shear with the testing machine.

Thereafter, measuring the strength of the samples showed that the different types of screw joints had no statistically significant difference with each other but their strength of other joint types had a significant difference. The results of this research showed the requirement of proper mechanical activity for improvement of each joint. Use of screw joint number 5 without sacking into any kind of stick was recommended in the wooden sheets.

Key words: Joints, screw, dowel joint, lateral shear strength, P.V.A resin, UF resin

Quantitative and qualitative analysis of endosulfan by ion mobility spectrometry

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Negative ion spectrum for endosulfan (Thiodan, 6,7,8,9,10,10-hexachloro-1,5,5a,6,9,9a-hexahydro-6,9-methano 2,4,3-benzodioxathiepin-3-oxide) has been studied in air at ambient pressure using ion mobility spectrometry method. The detection limit and dynamic range of this compound, was $4.0 \times 10^{-10}$ g and $10^2$ g, respectively. Furthermore, in this study, the influence of cell temperature and sample amount on the ion mobility spectrum of endosulfan was investigated.

Key words: Endosulfan; ion mobility spectrometry
Study of gamma irradiation to preparation of foot and mouth disease inactivated vaccine

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Foot and mouth disease (FMD) is the most contagious disease of cloven-hoofed animals. It causes one of the most economically damaging diseases that affects livestock animals, such as: cattle, sheep, pig, goat and etc. The symptoms are blisters in the mouth, especially on the tongue, occasionally on the nose (in pigs), and on the coronary bands of the hoofs. Many scientists studied inactivation of viruses by ionizing radiation such as gamma radiation and its effects on antigenicity of viruses. Some of the researchers from Argentina studied for the production of some inactivated vaccines by ionizing irradiation of some viruses such as FMD virus, Herpes Simplex virus and so on. In this research FMD Virus type A87/IRN was used, and the virus was multiplied on BHK21 cell line. Then virus titration was detected by TCID 50% method; it was 107.5/ml.

FMD virus was irradiated by gamma ray from 60 Co. sources in 0-4 °C. The gamma cell model Issledovapel-PX-30 with dose rate 0.551 Gy/sec was applied. Different doses of gamma ray were applied and 6 times were repeated for each dose. Safety test was done by cell culture and TCID50% method, also antigenicity of irradiated and control virus samples were studied by Complement Fixation Test. The irradiation inactivation curve for FMD virus was done, according to the curve and D10 Value factor was obtained and the optimum dose for inactivation of FMDV type A87/IRN and unaltered antigenicity was obtained about 44 kGy. Also the irradiated virus formulated as a vaccine with Al (OH) 3 gel and other substances.

Key words: Foot and mouth disease virus, gamma irradiation, inactivated vaccine
Features of the biochemical adaptation of agricultural crops at the action of the biotic and abiotic factors of environment

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The from biochemical point of view, researches on the plant adaptation to unfavorable environmental factors always are actual and directed to solution of the problem obtaining high yield of agricultural plants. Process of plant adaptation to both biotic and abiotic factors connects with transformation of a protein and enzyme complex, oxidizing and anti-oxidizing processes and phenolic metabolism. A certain role in regulation of plant responses to different nature stress factors belongs to salicylic acid (SA), which may be trigger to activate plant protection mechanisms during diseases and abiotic stresses.

Lectin activity was studied by method of hemagglutination response of white rats trypsinised erythrocytes. Reaction of lectin competitive inhibition carried out by method of lutsik. An activity of a lipoxygenase (LOX) was measured spectrophotometrically at 440 nm using linoleic acid as a substrate by method of Budnickaya. Activity of phenilalanineammonia-lyase (PAL) was determined by modified method of Zucker. SA concentration was quantitated by HPLC. Lipid peroxidation (LPO) was measured for MDA accumulation. Glutathione content was determined using Ellman reagent. The catalase activity was determined by method of Koroljuk. H2O2 was measured using fluorometric method of Ebermann and Couperus. NO content was measured for the level of nitric oxide stabile metabolites NO2⁻ and NO3⁻.

Influence of both Fusarium spp., Bipolaris spp., drought and 2mM SA on modification of protein and enzymatic complex, oxidizing and anti-oxidizing processes, content of endogenous SA, H2O2, NO have been studied in the winter wheat, barley and maize plants that differed in their resistance to pathogens and drought. Changes in cell walls lectin activity and carbohydrate specificity in plants from different families of cereals have been demonstrated in the presence of the pathogen and under the action of 2 mM SA. Levels of wheat, barley and maize genotype resistance to Fusarium spp, Bipolaris spp. affected to the rate
of these changes. It was supposed that not only generic but also genetics differences in the specificity of the lectin accumulation and redistribution lie in the basis of differential sympathy and, as investigated, efficiency of participation of these proteins in the adaptive reactions. It was shown that dynamic of LOX, PAL changes in cereals genotypes at infection of *Fusarium* spp., *Bipolaris* spp. and at the action of SA has a different orientation in junction with a degree of genotype resistance and culture genus that testifies to adaptation character of these changes. Functions and role of SA, H$_2$O$_2$ and NO in the seedlings of cereal crops at pathogenesis were explored. The differentiated changes of these indicators are founded. They were connected with the level of the genotypes resistance of wheat, barley and maize to *Fusarium* spp, *Bipolaris* spp. It was established that the decline of the LPO with the safety of antioxidants level of seedlings in maize genotypes are a plant adaptive reactions during drought. It was showed that strengthening of LPO with a next mobilization of antioxidants level could serve as one of the protective reactions of cereal crops at infection by *Fusarium* spp, *Bipolaris* spp.

It was concluded that studied physiological-biochemical processes take part in forming the mechanisms of cereals crops resistance to *Fusarium* spp., *Bipolaris* spp. and drought; and SA is the activator of immune properties of cereal crops. Based on the received results, new methods of estimation of wheat and barley genotype resistance to *Fusarium* spp., *Bipolaris* spp. were developed. It got 2 Ukrainian patents for these methods (patent #12639, declarative Ukrainian patent #43280).

Key words: wheat, barley, maize, resistance, salicylic acid, drought, *Fusarium*, *Bipolaris*

**Effect of water deficit on accumulation and contribution of carbohydrates to osmotic adjustment and drought tolerance during vegetative growth stage of wheat cultivars**

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There is a specific relation between accumulation of some low molecular weight organic solutes generically termed compatible
solutes, which plays a role in cell osmotic regulation, and drought tolerance in water deficit induced plants. Osmotic adjustment is considered to be an important component of drought tolerance mechanism in plants. In this paper, a greenhouse study was carried out using wheat cultivars (*Triticum durum* and *Triticum aestivum*) differing in their field performances under semi-arid conditions. At the seedling stage, Plants were randomly distributed within two groups to which different water treatments were applied: high soil water content (control plants) and low soil water content (stressed plants). Water stress imposed by withholding water for 15 days. Water potential, relative water content (RWC) and changes in carbohydrates and proline were determined on four plants per treatment. Proline and total water-soluble carbohydrate, glucose, fructose, sucrose were measured in the leaves. Water stressed plants showed a decrease in leaf water potential and relative water content (RWC) in all cultivars, but changes were highest in durum wheat. Water stress also induced an increase in both soluble carbohydrates, particularly glucose and fructose and proline concentration. Sucrose concentration correlated less well than that of monosaccharides with changes in water deficit. Differences in the accumulation of carbohydrates associated with osmotic adjustment occurred early in response to water deficit. The pattern of proline accumulation was different and varied with the cultivar. These findings suggest that capacity to accumulate monosaccharide carbohydrates is at least partly associated with the capacity of wheat to osmotically adjust and to resist drought.

Key words: Wheat, water deficit, osmotic adjustment, drought tolerance
Investigation on cultivation of wild king oyster mushroom (*Pleurotus eryngii* DC: Fr. Quel) of Chaharmahal-va-Bakhtiyari province, Iran

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Sixty-three isolates of *Pleurotus eryngii* DC: Fr. Quel were collected from various geographical location of Chaharmahal-va-Bakhtiyari province (Iran). After obtaining pure cultures, morphological and ecological characters as well as vegetative and reproductive growth phases were studied. Morphological characteristics indicated that the isolates are belonging to king oyster mushroom (*P. eryngii*). They scattered among 1500-3600 m altitude, 22-23º and 49-50º longitude. Evaluation of growth rate showed that 20º C is the optimum temperature for vegetative growth phases; however the lowest growth rate was observed at 40º C. Among the above mentioned isolates only three of them showed reproductive growth phases and for the rest, growth was stopped at vegetative phases.

Key words: *Pleurotus eryngii*, vegetative growth, reproductive growth, temperature, ecology

Relationship between some nutrient uptake and early falling of seeds in ash (*Fraxinus excelsior* L.)

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Ash (*Fraxinus excelsior*) has a distribution from Astara in Gilan to Gildaghi in Golestan province in North of Iran. This species is used widely in reforestation programs because of its suitable growth, production and resistance against cold and drought. But investigation
on metabolic evaluation of seeds has shown that most of them were hollow and early falling. In this investigation, the effect of plant nutrition was studied during 2 years in Gisum region in Gilan province. The amount of potassium, calcium, sodium, magnesium and phosphorus was measured by atomic absorption and spectrophotometer in leaves. Samplings were done in four months (June, July, August and September). Sampling from soil was done and the chemical and physical properties were determined. The amount of elements showed that the amount of Mg was optimum but phosphorus was more and calcium was much more than required. In spite of optimum amount of potassium in soil, measurement of K in leaves showed a severely deficient. Results indicated that pH of soil has changed about 1-2 unit from neutral to acidic (5.5-5.2) reaction during past 30 years. In acidic soils, the absorption of K by roots is limited but the absorption of Ca is increased. This caused disorder in Ca/K ratio. This situation along with climatic changes caused reduction in production and remaining of seeds in ash.

Key words: Fraxinus excelsior, nutrient uptake, seeds

Ecophysiological response of Pistacia Khinjuk L. and P. mutica L. to salinity and drought stresses

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Khinjuk and mastic pistachio (P. khinjuk L. and P. mutica L.) are empirically used as osmotic resistant rootstocks for production of nut pistachio trees. Empirical observations are an important source of information, but it must be confirmed by ecophysiological characterization. Exposures of both pistachio species to different osmotic stresses (NaCl and PEG 6000) led to a significant reduction in net photosynthesis rate \( P_N \) whereby the reduction was initiated at moderate and became pronounced at severe level. In treatment with salinity (NaCl), control compared values for \( P_N \) showed an increase at low level 6 decisiemens per meter (dS.m\(^{-1}\)) and a decrease at moderate (12 dS.m\(^{-1}\)) and severe (19 dS.m\(^{-1}\)) stress levels. Such a response was also observed for transpiration rate \( E \). An increase in osmotic adjustment (\( \Delta \Psi_s \)) occurred at moderate and severe stress levels.
For both pistachio species drought stress treatments induced by polyethylene glycol 6000 (PEG) had significant inhibitory effects on stomatal conductance ($g_s$). Control-compared $P_N$ values for P. khinjuk showed lower reduction versus increasing drought stress than for P. mutica. Drought stress promoted significant differences in stressed plants versus control plants for both leaf water potential ($\Psi_L$) and leaf osmotic ($\Psi_\pi$). Both pistachio species have the capacity to maintain relatively high photosynthetic activity with increasing electrical conductivity of nutrient solution ($EC_{ns}$) and decreasing osmotic potential of nutrient solution ($\Psi_s$). We concluded that Khinjuk pistachio revealed greater stress tolerance than mastic pistachio.

Key words: osmotic stress, leaf water status, transpiration, photosynthesis, stomatal conductance

The effects of climatic factors on crop production in Chaharmahal-va-Bakhtiari

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All crops differ in their biological characteristics and their environmental requirements, while the physical character of the earth’s surface varies greatly from place to place. A many variable influence plant growth and development, including day-length, the amount of received solar energy, amount of precipitation available for transpiration, temperature during the growing season and level of mineral plant nutrients in the soil. Many of these variables, all critical for successful plant growth, can be modified by the farmer; for example: in dry regions irrigation can supplement precipitation, fertilizers can add plant nutrients and temperature and day-length can be modified by growing crops indoors with heating and controlled lighting. But all these modifications of the natural environment are costly. These are, however, some parts of the earth’s surface where a particular crop will grow best without these modifications, and knowledge of such places helps to explain the distribution of crops.

In this study, by analysis the climatic factors of Chaharmahal-va-Bakhtiari province and determination of climatic requirements of important crop plants in the region, the suitable regions for crop production were identified. To achieve this, in addition to climatic
factors, the heat unit index (Growing Degree-Day) was also used. One of the basis of the assumptions, the southern and the southwestern regions are suitable for cultivation of the thermophilic plant while the rest of the province may be more suitable to frost-resistant varieties such as wheat and barley. In addition, the variations of cultivated area under each crop and its yield per unit area were investigated as a function of climatic variable especially annual mean precipitation and temperature. The results are shown in the form of regression equations and figures. Using stepwise regression, the yield functions for crops grown in different climatological regions of the province were estimated. For each crop, the regression equation was derived using climatological variables. The results indicate that the yield in dry land farming fluctuates with annual rainfall while yield in irrigated farmlands depends on other factors especially temperature during growing season. Based on climatological requirements climatological region of the province, suitable varieties were recommended to be included in crop rotations.

Key words: Degree-day, climatological, climatic factors, crop production

Investigation on crown shape and length of trunk without branch of beech trees in north forests of Iran (case study: Ramsar region/Beneshky beech forests)

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Beech tree (Fagus orientalis) is a species of Fagus genus and Fagaceae family. Beech forests are the most valuable forests in northern part of Iran. These forests are economically very important and knowing their status may help us to treat the problems of silviculture and forest management more knowledgeably. The Beech forests in Iran cover a tape 700 km in length and 40-50 km wide on north slope of Alborz Mountains (south of Caspian sea) from Astara to Dareh Zeyarat in Gorgan province. Their minimum and maximum altitudes are about 600 and 2200m from sea level respectively. This research performed in a section of Ramsar forests called "Beneshky beech forests". They are started from altitude 900 m from the sea level and continue to 2100m. Their general slope direction is northward.
The main objective of this study is describing of status of crown shape and determine of length of trunk without branch which are important parameters in forest improvement. To do this, the beech forests were divided to 6 altitude classes (as treatment) i.e. 900-1100, 1100-1300, 1300-1500, 1500-1700, 1700-1900, 1900-2100 meter from sea level. Systematic random sampling was used as a method for sampling. Thirty circular plots were selected in each class (180 plots all). Each sample had 1000m² area. In each sample parameters such as crown shape and length of trunk without branch of beech trees were evaluated. Analysis of data was done by SPSS software and was used completely randomized design. The treatments were compared by Duncan's Multiple Range Test. The results showed that except the last altitude class (1900-2100 meter from sea level) there was no significant different in crown shape between other altitude classes. But the length of trunk without branch of beech trees in all altitude classes was significantly different. The highest length of trunk without branch was 11.9 meter in 1300-1500 meter from sea level and the lowest was 2.2 meter in 1900-2100 meter from sea level.

Key words: Beech forests, Fagus orientalis, Ramsar, crown shape

Phenolics in the seed coat of oriental beech (Fagus orientalis Lipsky) as an autotoxic factor

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The aim of this article is to give adequate reasons to explain germination improvement of oriental beech (Fagus orientalis) seeds and acceleration of dormancy breakage due to endocarp removal. The results showed that the endocarp surrounding oriental beech seeds did not restrict water imbibition, i.e. both nuts and seeds were fully imbibed after 72 h. Quantification using half-strength Folin-Ciocalteu reagent and UV spectroscopy revealed a significant higher exudation of phenolics in seeds in compare with nuts (seeds with endocarp) during cold wet stratification. On the other hand germination of radish seeds was suppressed with 10-5 M GAE concentration of this extract. Total water-soluble phenolics in the seed coat were quantified to be 0.72 mg gallic acid equivalents (GAE) per gram dry weight. Gallic acid, p-hydroxybenzoic acid and, hydroxycinnamic acid were the main phenolics in the water extract of seed coat which were qualified as
phenolics with toxic property, using GC-MS. It was speculated that the high concentration of phenolics of seed coat in the endocarp cavity after imbibition, inhibits germination or delay dormancy breakage of beech seed, which make the seed of this species with two dormancy mechanisms, physiologic and seed-coat induced. Scarification or removal of the endocarp therefore, potentiates the stimulatory effect of cold moist stratification on germination of oriental beech nuts.

Key words: Allelopathy, autotoxicity, oriental beech, seed germination, seed dormancy, phenolics

Autecological study of *Salsola richteri* in Khorassan

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Autecology of *Salsola richteri* was studied in order to identify ecological factors affecting on this species and it’s relationships with Biotic and Abiotic components, so that some strategies were presented to develop it’s cultivation on sand dune for sand fixation.

It’s habitats were determined using topographic, edaphic climatic and geologic maps and field check. Two habitats were selected to study phenology, density, vegetation cover, plant height and associated species. Phenology was studied 10 – 15 days intervals. Soil sample were collected (0–100 cm) and analyzed. Plant regeneration and seed germination was studied.

Results showed that *Salsola richteri* is distributed in climates of cold arid and cold extra-arid (1024068.85 hectare) from yaz-tapeh Sarakhs in border of Ghareghome playa in northeast (altitude 270m) to Dashtehsahl-abad in Nehbandan (1400m). Annual mean temperature and precipitation of *Salsola* habitates were 16.5 degree centigrade and 150 –200 mm, respectively. Annual mean evapotranspiration was 3088 mm.
Section 3: Ecology and Sustainable Development

Salsola richteri is a perennial shrub with 3 m height. Leaves are agnostic linear and alternate. Vegetation growth initiated from March and changed to reproduction phase late in April. Flowers and fruits appear in mid May and mid June, respectively. Seeds are completely rippered late in september. *Salsola richteri* prefer sandy loam and silty soils with PH =7.57–8.5 and EC= 1.01-3 ds/m. Soil of habitats are mainly classified non prolific because of lack of organic matters. It regenerates both sexually (seed) and asexually.

Key words: shrub, *Salsola*, Autecology, phenology, desert, sand duns, Khorasan

**An estimation of heavy metals environmental impact from phosphorites of Egorievskoe deposit (Moscow regions, Russia)**

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Egorievskoe deposit of phosphorites is situated 120 km south-east of Moscow (Moscow Region, Russia). The deposit was exploited for about 60 years. Average concentration of P$_2$O$_5$ equals 14%. The percentage of P$_2$O$_5$ was doubled to 25-30% after mined phosphorites were concentrated. The concentrate was then crushed and grinded to phosphorite powder, which is used as a fertilizer. Unlike commonly used superphosphate fertilizer, which is highly soluble and assimilated by plants very quickly, phosphorite powder dissolves gradually during several years after carrying in soil and continuously feeds phosphorus into plants. Mining was suspended at Egorievskoe deposit in early 90th due to economic collapse in Russian agriculture. However, the mining of the phosphorite could be easily resumed at any moment in case of favorable economic circumstances.

We collected more than 300 samples of the phosphorites and analyzed them for 37 elements by emission spectroscopy. For 15 of the elements (B, Sr, Mn, Cr, Ni, Co, V, Nb, Pb, Cu, Zn, Sc, Zr, Mo, Ti) concentration well exceeds sensitivity of the analysis. The concentrations of all the studied heavy metals are below the permissible level for soils, accepted in Russia. Then, in case if phosphorite powder, produced from Egorievskoe deposit phosphorite, is used as a fertilizer, integrated heavy-metal impact on soils is estimated as acceptable. The phosphorite powder fertilized soils may be used for any agricultural purpose.
Estimated radioactivity of the fertilized soil, that was done by measurement of exposition dose power at 1 m above surface, its specific and effective radioactivity suggest minimal radioactive pollution level. Such soils may be used as agricultural lands of any kind. On the basis of the undertaken study we have concluded that the use of the Egorievskoe deposit phosphorite powder as a fertilizer is safe from environmental point of view.

Key words: Environmental impact, heavy metals, superphosphate, phosphorites, Moscow

Ecological investigation of euphrate (*Populus euphratica*), needs and limitations

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*Populus euphratica* is a tree species that distributed naturally in the bank of rivers in arid and semi-arid regions. It is geographically extended mainly in Asia and Africa. The acreage of *Populus euphratica* is about 20,000 ha in Iran. The natural presence of this plant in the border of Tedzhen river in the east of Khorasan is very important in environmental protection and soil erosion control as a result of river flow. This research was carried out in order to identify its limiting ecological (physical and biophysical) factors. Some of general characteristics of the study area are; annual precipitation (200mm), average temperature (17.4℃), maxes. and min. T. (46.6,-21.4). The climate of the study area, based on Coppen, Demartin and Ambergeh methods, is determined as Steppe, Arid and cold arid respectively. Study area was identified using satellite images, topographic maps and field observations. Study was performed on three selected sites. Factors such as: canopy coverage, anthropogenic effects, ground water level and edaphic factors were investigated based on 33 sample plots with the size of 10*10 meters were established systematic-randomly. Soil samples were collected on 19 plots in three depths: 0-30, 30-60, 60-90 cm. Laboratory tests were then performed to measure and calculate: soil texture, Sp, EC, pH, Na, Mg, CL, CaCo₃ and SAR.

Results indicate that human effects e.g. cutting of Euphrates as well as, periodical change of forestlands into croplands had been the major sources of Poplar forest decrease. Besides, periodical burning, chiefly
started from Turkmenistan, can eliminate old Euphrate masses by injection of fire toward Iran.

In the view of soil physical factors, the density of Euphrate shows positive correlation with clay presence at the depth lower than 60 cm but shows negative correlation with the proportion of sand on soil texture. Relationship between Euphrate and soil chemical factors specially EC, CL, Na and Mg is negative but tolerance range of Euphrate to these factors is high. Trend of forest and riverbank variations show that periodical floods had displaced river and eliminated significant portion of Euphrate in the border of river during last decades.

Ecological tests (such as Principal Component Analysis, PCA) indicate that among edaphic factors salinity, alkalinity and toxicity of chloride have destructive effects on the growth of *Populus euphratica*. Acidity and lime are not considered as limiting factors. Soil physical factors such as having light soil texture and absence of clay layer at rootable depth naturally prevent expansion of *Populus euphratica* to other sites.

Key words: *Populus euphratica*, ecology, geographic distribution, edaphic needs, climatic needs

**A study on the number of the agriculture students familiar with realization of sustainable rural development and the influencing factors**

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This study addresses the number of agriculture students of Ferdowsi University of Mashhad that are familiar with the necessities of sustainable rural development and the factors affecting it, using the field data. Data from examination of 450 questionnaires filled out by the students showed that 47.2% of the students had a low level of knowledge about the subject. Among the others, 32.7% were categorized with medium and 20.1% with high level of familiarity. Amid the various basics requirements for realization of sustainable rural development, acquiring a job and enough income was pointed out by the majority of the surveyed students; and promotion of literacy level, general and special backgrounds, setting up a participation
atmosphere in the rural society and promotion of the rural population both qualitatively and quantitatively were among the other factors mentioned. The data from variance analysis for the influence of independent variable on dependent ones showed that variables such as branch, and level of education, gender, experience of residency in rural places, doing rural activities, visiting the villages, and level of familiarity with the basic requirements of sustainable rural development had significant influences. While some other variables like age, average, grades, the year of entrance to the university, and occupation and education of parents had no significant effect. Also the majority of the surveyed students mentioned that dialog with university professors and experts, T.V. and radio programs, reading newspapers and magazines and classic courses as the most important methods for familiarization with the basics of sustainable rural development.

Key words: Social studies, sustainable development, rural communities, education, Iran

Autecology of *Bromus kopetdaghensis* Drobov in Khorassan

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In this research the ecological characteristics of *Bromus kopetdaghensis* Drob. that is a valuable rangelands plant of Khorasan and endemic of Iran and Turkmenistan, were studied. The major section of this research in nature and the other section in laboratory were done. These studies including the recognition of the plant; geographical distribution; morphology, life form, regenerative strategies, regeneration, phenology and also the effect of environmental factors like as altitude of sea level, geographic directions and the slope value were done on the personal characteristics of the plant including percentage of dry weight, plant density, percentage of cover, average of height and canopy cover. Soil sample of different growth regions including texture, salinity, acidity, CaCO₃, CaSO₄, percentage of organic material and was analyzed. the coexistence relation of VA mycorrhizas and so the diseases and pests were specified, the characteristics of seed germination including germination, optimum temperature degree and rapidity of germination.
was inspected and plant protein was inspected in the two stages of vegetative and generative.

Results showed that *B. kopetdaghensis* has the most cover between other perennial brome grasses in Khorasan. This species resembles *B. tomentellus* Boiss, which has differences with it in the height of the plant, the size of the leaves, length of the awn, the glum spikelet and the panicle. This species distribution is in different directions and slopes and 1300-2600 (m.s.l) in the North Mountains of Khorasan (Hezarmasjed, Kopetdagh, Binaloud, Aladagh). Habit of this plant is mostly on the limestone. The results of growth region’s soil analyzes also approves of high amounts of lime. In addition, this plant prefers the deep loam soil up to silt loam and nonsaline with high organic material and fertile soil. Percentage of canopy cover changes from 0.2 to 6.4 percent in each region. The results of complete data analyses showed that positive relation between percentage of canopy cover and height and also negative relation between percentage of canopy cover and the amount of slope were meaningful but the geographic trend does not have an effect on the analyses. According to Raunkiaer classification, this plant is hemicriptophyt, regenerates by seed and generally has bunch form growth. Phenological research showed that in the different studied regions the beginning of germination and passing different growth stages have differences with each other. Vegetative growth occurs primarily in spring. Flowers from May to June, seed set from May to early July and plant re-growth in autumn. Crude protein is more in vegetative stage than generative stage. The seeds, which have no dormancy, germinate rapidly if the temperature and moisture is suitable. They can’t germinate in 0°C and temperature changes are not significant between 5°C -25°C but the most percent of germination is in 20°C also seeds can keep their germination power for many years.

Key words: Autecology, *Bromus kopetdaghensis* Drobov, mount Hezarmasjed, mount Binaloud, mount. Aladagh, Mount Glydaghi, mount Kopetdagh
A survey of dynamic rangeland vegetation in the semi-arid areas of northern Khorasan province.

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The north part of Khorasan is considered as an arid and semi-arid zone and its rangelands are defined as steppe and semi-steppe. Because of its specific physical and climatic conditions such as lack of sufficient time dispersion and variable precipitation, these rangelands are severely affected by the variations. On the other hand, condition like incorrect managements and over grazing, changing to the non-irrigated and low-yielding farm-land and etc., have caused a great deal of impact on the rangelands.

This process of destruction is gradually intensified. The Agricultural Station of Sisab, about 47 km far from Bodjnord, has been selected as a defining station for the last 15 years due to its altitude and edaphic and climatic conditions. It is a preserved Zone so its qualitative and quantitative variations of vegetation and plant species are suitable to be studied.

In this experimental zone three managements of adjusting are used: 1- Restricted (Preserved) 2- Delayed grazing (Retarded) 3- Traditional or free grazing, then we designated 22 fixed quadrats (observable) in the inner part of the station, 10 quadrats in the outer part of the station for the retarded grazing, and 10 quadrats in the preserved part as the controls. The parameters, measured in this experiment were: presence of the cover, density, amount of production, percent of occurring of such plant species as: annual, perennial, forbs, grasses, invading species, increasing or decreasing species and defining them and determining the process of succession, alternation and frequency of the species during 1996-2000.

The performance process and analysis was implemented randomly with unbalanced design.

The comparison was done according to the Duncan’s design. We concluded that dry matter yield variation, percent of plant cover and occurring good quality ones instead of ill quality ones are severely affected by the type of management and the amount of usage. So the highest percent of cover and dry matter yield was related to the preserved, retarded and traditional grazing parts respectively.
Due to impact of preserving deployment, dry matter yield and percent of cover of the decreasing and increasing species, increased and oppressor rangelands were changed so that *Festuca ovina* is available in the preserved zone, while *Phlomis* sp was available in free (traditional) zone.

On the other hand, yield alteration and the cover percent in each quadrant were greatly subjected to the time dispersion of precipitation and sampling date throughout the years of study. The rangeland type in the retarded part was not changed and it was defined as *Phlomis* sp, as before the study due to short duration of grazing in spite of cover percent and yield alterations.

Key words: Rangeland restriction, delayed grazing, traditional grazing, dynamic rangeland, Semi arid aria

**Ecophysiological reasons for weakness and yellowing in natural and artificial habitats of *Haloxylon* spp**

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*Haloxylon* spp. has been planted for sand stabilization and control of desertion in Iran for a long time. Physiological weakness and yellowing in summer were the most problems of *Haloxylon* spp application for above mentioned goals. Ecology and physiology of *Haloxylon* spp. were studied in Yazd, Khorasan (Sabzevar location), Semnan and Isfahan (Kashan location) provinces. At first, ecological factors were studied in natural and artificial habitats. Results indicated *Haloxylon* spp. grew as mixed of different species in natural habitats with suitable distance between stands. This situation caused remaining of nutrients and access of trees to enough amount of water. *Haloxylon* spp had green phenotype during maximum dry period (from end of September up to middle of October). The natural generation rate was limited because of scattered stands and grazing of seeds by camels. In all studied artificial habitat, both green and yellow phenotype were seen during maximum dry period. This situation was seen in Khashan location because of soil properties. The seed origins were natural habitats of related provinces. These stands had different phenotype in clay and sandy soils. In addition natural generation rate were higher in clay soils because of water preservation in upper soil layers. Genetic analysis for determining of genetic difference between green and
yellow phenotypes during four seasons showed peroxidase alteration were regular and irregular in green and yellow phenotypes, respectively. Response of green and yellow phenotypes was different against temperature, pH and EC in vitro treatments. These results indicated different genotype of green and yellow phenotypes. In complementary, *Haloxylon ammodendron* and *Haloxylon persicum* showed different responses against pH and EC treatments. Seed proteins and enzymatic patterns were different in green and yellow phenotypes. Khorasan (Sabzevar) province results indicated sensitivity of *Haloxylon* spp to lack of oxygen. Then plantation of is not suitable in clay soils. Use of natural condition pattern and plantation of *Haloxylon* spp as mixed is advised for control of deserts. Seeds must be collected from green phenotype in the end of September for transferring 50% of maternal characters to trees. It is better to do modern systematic in natural and artificial habitats according to enzymatic patterns for determining difference between *Haloxylon ammodendron* and *Haloxylon persicum*.

Key words: Plant ecophysiology, *Haloxylon*, yellowing, enzymatic analysis, genetic variation

The application experience of aerosol treatments with the use of lepidocide for forest protection from pests

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Harmful forest insects cause large damages during outbreaks of their mass reproduction that can result not only in the increment decrease but also can be a cause of the destruction of forest stands. In Russia outbreaks of mass reproduction of a number of pests cover sizeable areas both of coniferous and deciduous forests. In this connection large areas are involved annually in the protective treatments of forests with the application of biological preparations using mainly aerial means. The aerosol treatment of forests with the use of biological preparations, especially of lepidocide, finds a wide application. Lepidocide is the Russian preparation, produced on the basis of *Bacillus thuringiensis* var. kurstaki. In order that the preparation could be applied with the use of aerosol means a special preparative form called lepidocide SK-M has been developed. It allows receiving effective results.
In 2001 protective treatments with the use of an aerosol generator were carried out on the area of ~0.2 ha in a focus of mass reproduction of Dendrolimus sibiricus in the Uiski forest management unit of the Chelyabinsk Region. They used lepidocide SK-M and at that the rate of application amounted to 3 litre/ha. Under favorable conditions the preparation ensured the 97-100% caterpillars death on the tenth day after the treatment.

The protective treatment of pine stands with the same preparation and the use the same aerosol means was carried out in a focus of mass reproduction of Lymantria monacha on the area of 3 722 ha in the Zhadowski forest management unit of the Ulyanovsk Region. The climate conditions were rather favorable as well. The main part of caterpillars was in the first age and their death on the tenth day made up 98-100%.

The aerial application of lepidocide SK-M with the use of the aircraft An-2 equipped with sprayer “Micronair” and navigator “Setlok” was carried out on the area of 17.0 thousand ha in the Inzenski and Bazarnosyzganski forest management units of the Ulyanovsk Region. Caterpillars were in the first and second ages; rate of application amounted to 3 litre/ha. According to assessments of the technical efficiency it was established that on the 21st day after the treatment the caterpillar’s death made up 89-93%. In 2003 in Altai the application of a mixture of lepidocide SK-M and viral preparation virin-ENSH with the use of aerosol means allowed to receive 100% caterpillar’s death. While a separate application of lepidocide SK-M and virin-ENSH in the spraying method ensured rather smaller caterpillars death.

Thus the application of highly productive aerosol means and up-to-date bacterial preparation SK-M allows receiving effective results in shorter time in comparison with the aerial spaying.

Key words: Forest protection, lepidocide, insects, Russia

Study of the educational needs of wheat growers of Khorasan in the field of sustainable agriculture

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The agriculture sector as the central factor in economic development of the country for providing food is facing a serious challenge.
Sustainable agriculture as an important issue for escaping from this crisis has drawn the attention of many agriculture experts.

In order to study the educational needs of the wheat growers of Khorasan in the field of sustainable agriculture, a survey was done on 567 wheat growers of this province. The results of the study indicate that most of the wheat growers (76.1%) need some training based on the goals and principles of sustainable agriculture in different fields. The data of the study shows that the most educational needs are in the field of using green manure (91.3%) and chemical fertilizers; and the least of them relates to the utilization of family and local labor force and crop rotation (3 and 22.6% respectively.) The results of the regression analysis show that there is a positive relationship between the age of the surveyed farmers, but the relationship between the level of experience or literacy and educational needs is a negative one.

Data needed were collected using a questionnaire and utilizing the classified random method for sampling. The data were analyzed using descriptive and non-parametric methods as well as regression method and a sustainability index for the agriculture system was created.

**Key words:** Wheat growers, educational needs, sustainable agriculture, Khorasan

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**Characteristic of the vegetative cover dynamics on pasturelands of meadow steppes in Mongolia**

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Analysis of field data allows us to speak about overall regressive changes of vegetative cover on the pasturelands independently of ecosystems’ type or disposition. The changes are indicated by declining vitality of fodder plants that are replaced with inedible foe livestock species (*Artemisia adamsii* etc.). On the initial stages, the herbage losses Gramineae species and meadow motley grasses. Then species such as *Artemisia frigida*, *A. laceniata*, *Halerpestes salsuginosa*, *Potentilla acaulis*, *Carex duriuscula* begin to penetrate and form communities. At that, aboveground mass of inedible plants can grow rapidly and exceed the mass of origin communities. Pasturelands differ from origin communities by their more xeromorphic and salt tolerant species. Virtually, the structure of communities and plant species composition become simpler through all the stages. The communities converge into sedge, *Iris* and five-
finger coenoses. During recover succession on enclosed territories, demutation of vegetative cover with a high constancy of species that tolerant to grazing: from low tolerant (*Stipa krylovii*, *Medicago falcata*, *Bupleurum scorzonerifolium*) to strong (*Cleistogenes squarrosa*, *Leymus chinensis* and so on).

Vegetative cover degrades not equally under different landscape conditions. So the communities confined to small depressions and river flood-lands form coenoses dominated by hydrophilous species: *Iris lactea*, *I. bungei* and *Artemisia laciniata*. Due to their poor consumption by livestock, they form stable communities, which point out a high level of degradation. Productivity of these species under grazing grows up and can reach 18.5 percent per ha. On river terraces and high flood-lands plant communities’ degradation shows clear tendency to xeromorphic coenoses. Succession under grazing on foothills froms from *Stipa* formations to *Artemisia frigida* and *Carex duriuscula*. The investigation has shown an increase of productivity up to 5.1 and 1.0 percent per ha respectively. During demutation of vegetative cover, one can see recovery of floristic diversity. Productivity grows up due to grass. These successions also go different ways. Coenoses dominated by *Iris sp.* in lake depressions recover to communities with predominance of *Agropyron cristatum*, *Achnatherum splendens* and *Carex duriuscula*. On some “reserve” points amount and productivity of *Leymus chinensis* increase from 6.5 to 80.0%. This fact allows us to make a conclusion that the formations with *Leymus* can be classified as stages of recovery succession. Form the other hand, these formations under given conditions are obstacles on the way of plant communities’ demutation to the sub-climax state for they are not stable, very competitive and coenotically closed.

Key words: Succession, plant composition, rangelands, Mongolia

**Response of canola (**Brassica napus** L.) to different rates of phosphorus and two methods of application**

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Phosphorus (P) fertilization is an important input for producing canola, the new oilseed crop grown in Iran. To optimize crop nutrition, P must be available to the crop in adequate amounts in growing season.
The method of fertilizer placement can have a considerable impact on the effectiveness of the phosphate fertilizer. A 2-Yr field experiment was conducted at five sites with calcareous soils and different available P levels to study the effect of P rates and application methods on canola yield and oil content. The experiment design was a randomized complete block with 9 treatments and three replications. Treatments included four rates of P: R1 (Recommended rate based on soil test), 0.4R, 0.75R and 1.25R and two methods of application (banded and surface broadcasting) and zero rate of P as control. Results showed that except one site, there were no significant difference between treatments and control on yield. On all sites no significant effects was observed on oil content. Canola was not responsive to added phosphate fertilizer on the calcareous soils of these sites. It appears that on these soils canola roots secrete organic acids into the rhizosphere which dissolve some of the P fixed as calcium phosphate, making it available for plant uptake.

Key words: Canola, phosphorus, fertilization

**Study of saxaul (Haloxylon spp) species for improvement and stabilizing of sand dunes**

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Desert is the biggest bioclimatic area in the world and saxaul (Haloxylon spp) is one of the most important species for sand dunes stabilizing as a biological combating desertification element. For improving and development of saxaul lands, 40 genotypes were collected from different areas of Iran and planted. Different characters such as height, cover, trunk perimeter, branch height, branch number, powdery mildew intensity and vigor were investigated. This research was carried out in Bajestan desert plants research station from 1998-2002. The results showed that generally, genotypes number 18 (Sistan) and 30 (Semnan) were the best for most of characters. For comparison of 3 Saxaoul species (Haloxylon persicum, H. aphyllum, H. ammodendron), above characters were investigated. The result showed, the thickest cover, the biggest trunk perimeter and the highest branch were seen in Haloxylon persicum and H. aphyllum and the lowest powdery mildew intensity and vigor were seen in H. ammodendron. Powdery mildew intensity was seen in H. aphyllum.
more than *H. persicum*. Vigor in *H. persicum* was better than *H. aphyllum*. There was a significant different between *Haloxylon persicum, H. aphyllum*, and *H. ammodendron* for branch number.

Key words: Desertification, breeding, saxaul, *Haloxylon*, powdery mildew, *Leveillula saxaoui*.

**Approaches obtained from congruence management of range management and combat desertification projects in desert communities**

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The opportunity of natural generation and regeneration was taken by fencing the field for precursor plants like *Stipagrostis plumosa* and concurrently the desert shrubs (*Siedlitzia rosmarinus*) with suitable condensation were cultivated by applying different methods of biological regeneration operations like pitting and countro pharo. Increasing the percentage of vegetation covers of pasture plants and improvement in the vegetation cover condition reflected the success in execution of the plan. The addition to supplying the grass needed by mentioned pasture, this plan has played an important role in the soil conservation and prevention of wind erosions and now is included in one of the best wintry pastures of Kashan deserts.

Key words: Desertification combating, rangeland improvement, Kashan

**Rehabilitation the desert lands wintry pastures by the use of biologic rehabilitation operations**

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By separating the land different habitats like salt flat, salt and alkali, sandy places and pediment areas and restricted area of any formation became distinguished on the basis of physiognomy – Floristic method. Then the whole vegetable species presented in formations of wintry pastures were collected and introduced. Some field studies were
performed about ecological properties of constant pastoral important species and formation adaptability and finally the operation of collecting seeds began by selecting the suitable, important and desired species of each geomorphological faces. from each faces a land was selected to carrying out the operation of biological rehabilitation and after preparing the flowerpot saplings. The seeds and saplings were cultivation in combining operation of projects range management and desertification combat.

The results obtained from this research were successful about plants cultivation of *Artemisia sieberi*, *Nitraria schoberi*, *Salsola arbuscula*, *Zygophyllum echwaldii* (90%). By performing the biological rehabilitation operation and using the genetics resources of Endemics and adapted plant to wintry pastures and with regards to the whole ecological properties of each of the plants, not only the results were successful in execution of combat desertification operation and prevention of wind erosions but also the opportunily of natural generating for plants has been prepared and the biological production potential of wintry pastures increased.

Key words: Desertification combating, rangeland improvement, Kashan

**Natural and human-induced changes of Western Jungaria landscapes (the region of Ebi-Nur Lake)**

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Dynamics of the Ebi-Nur Lake coastline during the Holocene and the main features of dust and salt storms induced by the lake regression were studied. Volumes and chemical composition of Aeolian material deposited at various distances from the lake’s deflated shores were assessed. Settlements with irrigated croplands were found to show the lowest salt levels in soil cover with chlorides and sulfates being predominating, while the lands around the lake as well as in cities are the mostly affected by salts, especially sulfates. Areas characterized by different intensity of dust and salt storms were distinguished. The contribution of dust and salt storms in degradation of the Western Jungaria lands was discussed.

Key words: Succession, lake dynamic, human interference, Jungaria
Vegetation maps on information provision for moscow region sustainable development

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One of the actual problems of the forestry is the evaluation the modern state and the degree of anthropogenic transformation of nature ecosystems for the planning of the natural–economic activity in the region. The important role in an evaluation of an ecological potential of territory belongs to vegetation maps.

The vegetation of Moscow region represents complex of plant communities, which are at different stages of succession process, forming ecological-dynamic ranges or epiassociations. The forest epiassociation - is the model of ecosystem, which includes the primary climax and all its dynamic modifications, including disturbed plant communities.

GIS - technologies allows revealing a botanical diversity, a dynamic state of forests of region based on the mapping analysis of territory. It needs a 3 steps cycle of mapping researches: drawing the inventory vegetation maps, maps of a degree transformation of plant communities (estimated mapping) and prognosis- recommendatory maps.

Different scales of estimated vegetation maps are necessary to consider as the uniform mapping information. Research system aimed at the decision of ecologic-geographical problems of region, especially such complex territories as the Moscow area with the considerably transformed vegetation.

GIS –system were used for a forest research in Naro-Faminsk district of Moscow regions. With its help were revealed: 1. The typological diversity of forest communities in according to the ecological-morphological classification. 2. Botanical-geographic regularities of the vegetation are correlated with landscape structure of territories. 3. The anthropogenic change of forest vegetation analyzed in terms of the dynamic system (epiassociations). Using geoinformational technologies enabled to determine the potential ability of modern vegetation and to select necessary data for reconstruction nature
ecosystems and to make the recommendations for protection of the most valuable forest massive.

Key Words: Botanical diversity, forests, vegetation mapping, structure and dynamic of plant communities, nature protection

Use of composted organic wastes as an alternative to synthetic fertilizers for enhancing crop productivity and agricultural sustainability on the tropical island of Guam.

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One of the most threatening factors for optimum soil quality, especially on the tropical island of Guam, is the low organic matter content. On the other hand, the negative environmental impacts of the application of synthetic fertilizers dictate a need for improved management of Soil Organic Matter (SOM) content for a sustainable land use system on Guam. Soil organic matter content is enhanced by effective management activities such as manipulation of soil environment via conservation tillage, use of green manure, and land application of composted organic waste. In our case study, preliminary results have shown that the application of composted organic waste increased crop yield and significantly enhanced the soil quality of severely eroded and degraded soils of southern Guam. In this study, composted organic material was applied on agricultural fields as an alternative to commercial fertilizers to provide nutrients, to enhance the organic matter content, and improve the physical and chemical properties of the cultivated soils. Land application of composted material as a fertilizer source not only provides essential nutrients to plants, but improves soil quality as well, while effectively disposing of wastes.

In our soil program at the University of Guam, we are evaluating the use of composted organic material as an alternative to synthetic fertilizers. More specifically, we are studying the effect of composted organic matter and inorganic soil constituents on soil productivity and environmental quality. Our long-range goal is to develop management strategies using available resources to improve crop production, while conserving resources and preserving environmental quality. The goal
Section 3: Ecology and Sustainable Development

of this specific research project is to improve soil fertility by applying composted organic waste and assessing the long-term effect of nitrogen and other essential nutrients on soil fertility and crop productivity without the addition of synthetic fertilizers. In our pilot project, compost is produced from wood chips from typhoon debris mixed with hog, horse and chicken manure; fish feed, shredded paper and other organic wastes. Mature compost is then applied on plots at the rate of 0, 30, 60 and 120 tons per acre as a soil amendment to eroded Cobbly clay soils in southern Guam. Corn is planted and monitored for growth performance and yield. In this presentation, the methodology, as well as up-to-date data will be presented to illustrate the effect of land application of compost organic wastes on organic matter content and other soil quality indices.

Key words: Soil quality, soil organic matter (SOM), organic matter content (OMC), compost, soil fertility, soil degradation, soil productivity, soil and plant testing, sustainable agricultural systems

Utilization of floodwater spreading, as a mechanism for sustainable development in arid and semiarid rangelands

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Jajarm floodwater spreading network is located in near Jajarm town, NW Khorassan province at a distance of 410 Km. from Mashhad, with an area of 290 ha. The climate is cold desert dry (on the basis of reformed Domartan method) with an average precipitation of 150 mm. annually in Jajarm meteorological station. The vegetation cover was investigated by mixed method of transect – quadrate and T-test used for comparison of the obtained data.

The results indicated that there were two plant types in the studied region including *Artemisia sieberi* – *Convolvulus fruticosus* and *Cousinia sp.* – *Convolvulus fruticosus*. Among the whole species of plant types, 4 species including *Artemisia sieberi*, *Salsola tomentosa*, *Stachys trinervis* and *Convolvulus fruticosus* as grazable plants by domestic animals were selected for comparing their production. On the basis of obtained data, flood water spread 10 times on the field with different volumes during 1998, 1999 and 2000 years which only 3 times, they filled the whole network and flew out via discharge canal.
These floodwaters were occurred 60% in spring, 20% in summer, 10% in autumn and 10% in winter. Effects of the floodwater on plant productivity were different so that, yields of *Artemisia sieberi* 150 – 310%, *Convolvulus fruticosus* 250 – 260%, *Stachys trinervis* 190 – 410% and *Salsola tomentosa* 60 – 120% were increased in comparison with the control.

Statistically, the differences of increased production between the field and the control, about plant type *Artemisia sieberi* – *Convolvulus fruticosus* was significant for species *Artemisia* and *Convolvulus*, and about plant type *Cousinia sp* – *Convolvulus fruticosus* was significant for species *Stachys*, *Convolvulus* and *Salsola* (P = 1%). Additionally, the floodwaters affected positively on regeneration and freshness of the plant species and caused to increase the period of vegetative growth and phenology.

Key words: Jajarm, floodwater spreading, sustainable development, *Artemisia sieberi*, *Convolvulus fruticosus*, *Salsola tomentosa*, *Stachys trinervis*

**Chemical coating "consisting of starch and synthetic polymers" in paper coating**

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In this research we have used some different kinds of chemicals mixed with cationic starch in different concentrations (0-10 percent of the weight of cationic starch).

The applied chemicals in accompany with starch were as following: Butadiene copolymer mixed with styrol, Alkylketene dimmer, Acrylic Acid mixed with Acrylonitrile, Styrol mixed with Acrylate. Coating amount was approx. 1.5-3g/m². With studing on physical-mechanical specification also printability and optical properties the suitable concentration of each above mentioned chemicals was determined.
It was discovered that mixture of butadiene and styrol does not have any effect on a/m specification but mixture of Acrylic Acid and Acrylonitrile has the highest effect on decreasing elongation and permeability also Cobb value of the manufactured paper was 20-23 g/m². Finally the best surface strength of the produced paper was result of mixture of styrol and Acrylate.

Key words: Coating, Paper, cationic starch, butadiene copolymer, styrol

The competitiveness of forest stands for sawmills and woodworking plants

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In Russia, about half of the volume of round-wood harvest is sawn to lumber. The choice of tree species, the sawlog quality, the optimization of cutting processes and sorting and gluing operations help to conform to sawmills and woodworking plants products requirements. In this respect of primary importance is the optimization of cutting processes which depend to different factors such as the size and the quality of sawlog, ways of sawlog cutting, ways of lumber cutting, lumber sorting fragmentation, sawlog sorting fragmentation. In this research on base of these factors we have created a mathematical equation for "sawlog - lumber – blank" technological cutting model as an end function, which is a mathematical representation of optimal efficiency criterion and the limitation system.

Our experiments show that the price only one species of softwood lumber can vary from 8 to 12% depending on its quality. The price variation for hardwood lumber is much bigger.

The results of research show that a tree species plays a most important role for raising the efficiency of sawmills and woodworking plants in future forest stands. The second important criterion for the profitability of sawmills and woodworking plants is the sawlog quality. The competitiveness of forest stands depends to a greater extent on their species composition.

Key words: Forest harvesting, sawlog quality, cutting processes, round-wood, sawmills
The green revolution in India; An experience

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The term 'Green Revolution' is a general one that is applied to successful agricultural experiments in many developing countries like India. The world's worst recorded food disaster happened in 1943 in British India. Known as the Bengal Famine, an estimated 4 million people died of hunger that year in eastern India. In 1947 India took independance and Indians were haunted by the memories of the Bengal Famine therefore the food security was one of the main items on free India's agenda. This awareness led to the Green Revolution. The Green Revolution took place in India from 1967 to 1978 and in 1979 India recorded the grain output of 131 million tons which estabilished India as one of the world's biggest agricutural producers.

There were three basic elements in the method of the Green Revolution: 1-Continuing expansion of farming areas. 2-Double -cropping in the existing farmland and 3-Using seeds with improved gentics. More than self-sufficient, India frequently exports its surpluses. India in 55 years has emerged from famine ridden colonial times, as a famin free Republic. Its population has nearly tripled in that period. More significantly, India in 1947 lost some of its most fertile lands. But she has managed to standup and falsify many prophesies of doom. India was the greatest success story of the Green Revolution. Although India benefited (apart from Economic) from political and sociological point of view, but her agriculture is at a crossroads again, the Green Revolution of the sixties gained some crucial decades for India in which to rethink her way forward.

Key words: Green revolution, India

Potential new crop development in a developing socio-economic context – the importance of biodiversity

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Biodiversity plays a key role in new crop development and domestication of useful wild plants, and will be the key to successful
diversification into new production activities in the (dry/semi-arid/humid) tropics and to the socio-economic development of poor, esp. rural populations. New crops can help to diversify an otherwise limited nutritional basket of products, and thus improve nutrition and health status of third world populations. The paper presents the major issues that need to be addressed in order to pave the way for successful new crop development based on local (plant) resources.

Key words: Biodiversity, tropical areas, crop development

**Study on physical and mechanical properties of composite panel made from mixture of poplar chips and recycled tire**

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This study was conducted regarding the possibilities of use and replacement of automobile tire in manufacturing composite panel. The variables included: Mixing ratio of rubber chips at four levels, 0 (Witness samples), 25, 50, 75%; percentage of resin content at three levels: 3, 4, 5% and Density at two levels of 0.55 gr/cm³, 0.75 g/cm³. Taking samples and measurements were conducted after 2 and 24 hours of floating in water, thickness swelling was determined according with the DIN-68763 standard and impact strength according with ASTM D-3499 standard. The results of this study showed that the increase in amount of rubber chips have noticeable effect on physical and mechanical properties of the composite panel. With the increase of rubber chips there is a decrease of thickness swelling and increase of density increases thickness swelling, also with the increase of rubber chips and density there is an increase in impact strength. Minimum of thickness swelling after two and twenty four hours of floating in water are at mixture percentage of rubber chips at 75%, resin content at 5% and density at 0.55g/cm³. Maximum impact strength is at rubber content of 50%, resin content at 5% and density at 0.75g/cm³.

Key words: Composite panel, mixing ratio, resin content, recycled tire, physical and mechanical properties, impact strength and thickness swelling.