# CRUSHING SUSCEPTIBILITY OF VETCH SEEDS UNDER IMPACT LOADING

**F. SHAHBAZI**

**ABSTRACT.** Mechanical damage of seeds due to harvest, handling and other process is an important factor that affects the quality and quaintly of seeds. The objective of this research was to determine the effects of moisture content and the impact energy on the breakage susceptibility of vetch seeds. The experiments were conducted at moisture contents of 7.57 to 25% (wet basis) and at the impact energies of 0.1, 0.2 and 0.3 J, using an impact damage assessment device. The results showed that impact energy, moisture content, and the interaction effects of these two variables significantly influenced the percentage breakage in vetch seeds ($p$<0.01). Increasing the impact energy from 0.1 to 0.3 J caused a significant increase in the mean values of seeds breakage from 41.69 to 78.67%. It was found that the relation between vetch seeds moisture content and seeds breakage was non-linear, and the extent of damaged seeds decreased significantlyas a polynomial (from 92.47 to 33.56%) with increasing moisture (from 7.57 to 17.5%) and reached a minimum at moisture level of about 17.5%. Further increase in seed moisture, however, caused an increase in the amount of seeds breakage. Mathematical relationships composed of seed moisture content and impact energy, were developed for accurately description the percentage breakage of vetch seeds under impact loading. It was found that the models have provided satisfactory results over the whole set of values for the dependent variable.

**Keywords:** vetch seed, breakage susceptibility, moisture content, impact energy.

# EFFECT OF DEFICIT IRRIGATION ON RAISED BED WHEAT CULTIVATION

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**ABSTRACT.** The experiment was conducted during Rabi season of 2015-2016 and 2016-2017 at the Regional Agricultural Research station, BARI, Ishurdi, Pabna, Bangladesh, to determine the water requirements of wheat on raised bed and the effect of different deficit irrigation on yield, water use efficiency and applied water productivity under raised bed wheat. This study consisted of following irrigation treatments: $T_1$ = Irrigations up to 100% field capacity (FC) at crown root initiation (CRI), botting and grain filling stages (flat bed), $T_2$ = Irrigations up to 100% FC at CRI, botting and grain filling stages on raised bed, $T_3$ = Irrigations up to 80% FC at CRI, botting and grain filling stages on raised bed and $T_4$ = Irrigations up to 60% FC at CRI, botting and grain filling stages on raised bed and laid out in a randomize complete block design with three replications.The result showed that significant effect of irrigation treatments were observed on plant height, spike per $m^2$ and grain yield. Highest grain yield (4.66 t/ha) was obtained from treatment, irrigations up to 100% FC at CRI, botting and grain filling stages on raised bed, followed by irrigation up to 100% FC at same stages on flat bed. At raised bed wheat cultivation saving 14.30% water with increasing 15.66% grain yield than flat bed. Besides, comparing deficit irrigation (20% and 40% of full irrigation) and full irrigation condition on raised bed seeding system water use could be reduced about 4.18% to 5.57%, while scarifying 18.20% to 32.33% grain yield, where reduced 14.17% to 27.54% water use efficiency. Maximum applied water productivity 1.81 kg $m^{-3}$ was

observed in raised bed full irrigation condition. The rate of daily evaporation started to increase as the temperature started to rise and humidity started to decrease during the crop growing period. The results will be helpful for taking policy decision regarding efficient irrigation and water management under prevailing water scarce situation.

**Keywords:** inadequacy irrigation; water use efficiency; applied water productivity; bed planting.

## COMPARATIVE PHYTOTOXICITY OF AQUEOUS EXTRACTS OF *CENTAUREA MACULOSA* AND *MELILOTUS OFFICINALIS* ON GERMINABILITY AND GROWTH OF WHEAT

**S. SIYAR, Z. CHAUDHRY, A. MAJEED**

**ABSTRACT.** Weed incursion in cultivated fields is a serious biological problem, which causes considerable yield losses of economically important field crops through allelopathy and competitive interactions. Spotted knapweed (*Centaurea maculosa*) and yellow melilot (*Melilotus officinalis*) are among the most prevalent weeds in cultivated fields of Pakistan, particularly in wheat fields. Like many other weeds, they may pose allelopathic and competitive challenges to field crops. The objective of this study was to evaluate allelopathic potentials of the two weeds on germination and seedling growth of wheat under laboratory conditions. Amounts of 15, 20, 25 and 30% concentrated leaf aqueous extracts of *C. maculosa* and *M. officinalis* were prepared and tested for their effects on germination percentage, radicle and coleoptile lengths of wheat. Germination, radicle and coleoptile lengths of test crop declined significantly at higher concentration (25-30%) of the extracts of two weeds. However, concentration of *M. officinalis* up to 20% had either no effect or stimulatory effects on the studied growth characteristics of wheat. Highest germination inhibition and decreased seedling growth were caused by leaf extracts of *C. maculosa* at 30% extract concentration. Growth inhibition was generally dependent on the extract concentration. The study indicated that both plant exhibited allelopathic activity and growth inhibitory effects on wheat at higher concentration; however, extracts of *C. maculosa* were more phytoinhibitory than *M. officinalis*. The weeds could serve as potent allelopathic plants for management of other weeds.

**Keywords:** allelopathy; allelochemicals; early growth; invasive plants; weeds.

## ASSESSMENT OF ET-HS MODEL FOR ESTIMATING CROP WATER DEMAND AND ITS EFFECTS ON YIELD AND YIELD COMPONENTS OF BARLEY AND WHEAT IN SEMI-ARID REGION OF IRAN

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**ABSTRACT.** In order to estimate the water requirement of barley and wheat by using of ET-HS model, a research was conducted at Research Farm of Islamic Azad University, Isfahan (Khorasgan) Branch, Iran. ET-HS model is used to determine irrigation water quantity and irrigation schedule for different crop. The study was based on randomized complete block

design (RCBD) with three replications and six treatments. The irrigation treatments included irrigation to supply 50, 75, 100, 125 and 150% of crop water demand on the basis of ET-HS model during growing season and control treatment (conventional irrigation), which was irrigation on the basis of 70 mm evaporation from Class A evaporation pan during growing season. In barley experiment, the highest values for number of fertile tiller, maximum LAI, total dry matter in maximum LAI stage, number of grain per spike, a thousand seed weight (35.56 g), grain yield (7877.9 kg/ha), biological yield (17689.7 kg/ha) and harvest index (44.45%) was obtained for irrigation according to 100% of crop water demand on the basis of ET-HS model. In wheat experiment, the highest number of fertile spike, number of grain per spike, 1000 grain weight, grain yield, biological yield was obtained for irrigation treatment on the basis of 100% ET-HS model; moreover, the maximum harvest index was related to control treatment, followed by irrigation on the basis of 100% of ET-HS model. Conclusively, the appropriate irrigation treatment was 100% of crop water demand on the basis of ET-HS model during the growth season for both crops.

**Keywords:** irrigation schedule; evaporation; LAI; grain yield; harvest index.

## IMPROVEMENT OF GROWTH AND YIELD OF MAIZE (*ZEA MAYS* L.) BY POULTRY MANURE, MAIZE VARIETY AND PLANT POPULATION

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**ABSTRACT.** Soils of the savannah zones of Nigeria are low in plant nutrients and peasant farmers; therefore, rely on external inputs in the form of organic and inorganic manure for sustainable yield. They also sow their seeds at suboptimal plant population density, thereby providing opportunity for weeds to thrive. Moreover, farmers use saved seeds from the previous cropping season for planting, which often results in low yield**.** A study was conducted to assess the growth and yield of two maize cultivars under the influence of organic fertilizer and plant population density. Treatments used were factorial combinations of three levels of poultry manure (0, 2.5, 5.0 t/ha), two population densities (95,556 and 53,333 plants/ha) and two maize varieties (DMR-ESR-Y and Suwan-1-SR). Data were collected on number of leaves, plant height, leaf area, stem girth, root and shoot dry weight, total dry weight, days to tasseling, days to silk appearance, grain yield per hectare, number of seeds per cob, seed rows per cob, weight of 100 seeds and shelling percentage. The results revealed significant improvement ($p \leq 0.05$) in all parameters examined, when 5 t/ha poultry manure was applied to Suwan-1-SR at density 53,333 plants/ha. However, there was marginal difference between 5 and 2.5 t/ha in grain production. Therefore, application of 2.5 t/ha poultry manure for production of Suwan-1-SR maize variety at plant density 53,333 plants/ha could be used for getting optimum yield, that can feed the growing population of maize consumers coupled with better straw production for animal feed.

**Keywords:** organic manure; plant density; growth, yield.

# EXOGENOUS APPLICATION OF GIBBERELLIC ACID IMPROVES THE MAIZE CROP PRODUCTIVITY UNDER SCARCE AND SUFFICIENT SOIL MOISTURE CONDITION

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**ABSTRACT.** Drought stress creates imbalance or deficiency of some growth regulators in plants, which leads toward reduced crop yield. Gibberellic acid is one of the most important growth regulators in plants, which improve drought tolerance in plants under optimum concentration. A field experiment was conducted under exogenous application of gibberellic acid under normal or drought condition and with or without gibberellic acid application. Crop growth and yield parameters were assesses during the experimentation. Study revealed that crop reduced growth in term of leaf area index (LAI), leaf area duration (LAD), crop growth rate (CGR), net assimilation rate (NAR) and total dry matter (TDM) under drought condition, while these parameters were improved with gibberellic acid application. Similary, improved growth rate resulted in better performance of yield attributes (cob length, cob diameter, grains per cob, grain weight and yield). Gibberellic acid application improved the crop performance at optimum irrigation, as well as under reduced irrigation. Although highest crop yield was recorded with gibberellic acid application under optimum irrigation level, while its application under drought stress improved crop tolerance and resulted in better crop yield, similar to optimum irrigation level. Exogenous application of gibberellic acid not only improved the drought tolerance in maize, but also increased the crop yield under normal condition.

**Keywords**: drought; growth regulator; crop growth; yield.

**REZUMAT. Aplicarea exogenă a acidului giberelic la creşterea productivităţii culturii de porumb în condiţii de umiditate scăzută şi suficientă a solului.** Stresul produs de secetă creează dezechilibre sau deficienţe ale unor regulatori de creştere în plante, ceea ce duce la o producţie redusă. Acidul giberelic este unul dintre cei mai importanţi regulatori de creştere în plante, care îmbunătăţeste toleranţa la secetă la plante, la o concentraţie optimă. Un experiment de câmp a fost realizat prin aplicarea exogenă a acidului giberelic în condiţii normale sau de secetă şi cu sau fără aplicarea acidului giberelic. Creşterea culturii şi parametrii de producţie au fost evaluaţi în timpul experimentării. Studiul a evidenţiat o creştere redusă a culturii în ceea ce priveşte indicele suprafaţei frunzei, durata perioadei de creştere a frunzei, rata de creştere a culturii, rata de asimilare netă şi cantitatea totală de substanţă uscată în condiţii de secetă, în timp ce aceşti parametri s-au îmbunătăţit prin aplicarea acidului giberelic. In mod similar, rata de creştere îmbunătăţită a dus la o performanţă mai bună a însuşirilor de randament (lungimea ştiuletelui, diametrul ştiuletelui, boabe pe ştiulete, greutatea bobului şi producţia). Aplicarea acidului giberelic a îmbunătăţit performanţa culturii la irigarea optimă, precum şi la irigări reduse. Deşi cel mai mare randament al culturilor a fost înregistrat la aplicarea acidului giberelic la un nivel optim de irigare, aplicarea acestuia în condiţii de secetă a îmbunătăţit toleranţa culturilor şi a dus la un randament mai bun al acestora, similar cu nivelul optim de irigare. Aplicarea exogenă a acidului giberelic nu numai că a îmbunătăţit toleranţa la secetă a porumbului, dar a crescut şi randamentul culturii în condiţii normale.

**Cuvinte cheie**: porumb; acid giberelic; secetă; creștere; randament.

# STATUS OF *DHAINCHA* INCORPORATED SOIL AFTER RICE HARVEST IN (*BORO*) RICE–*DHAINCHA*–RICE (T. *AMAN*) CROPPING PATTERN

**SONTOSH C. CHANDA, A.K.M. GOLAM SARWAR**

**ABSTRACT.** An experiment was conducted at Field Laboratory of the Department of Crop Botany, Bangladesh Agricultural University, Mymensingh, to find out the effect of *dhaincha* incorporation on subsequent rice crop yield and post-harvest soil nutrient status. The experiment was laid out in a randomized complete block design having three replications. Nine *dhaincha* accessions were used as experimental materials along with a control (without *dhaincha* plant). Seeds of *dhaincha* accessions were sown in experimental plot @ 60 kg $ha^{-1}$. Sixty days old *dhaincha* plants were mixed up with soil. Soil samples were collected twice, before sowing of *dhaincha* seeds and after rice crop harvest. Forty five days old healthy rice seedlings were transplanted in the well prepared *dhaincha* incorporated plots at the spacing of 15 cm x 25 cm (plant-plant x row-row). The pH and nutrient status were improved in *dhaincha* incorporated soil over the control. The highest grain yield (5.81 t $ha^{-1}$) was obtained from *dhaincha* Acc. 33 incorporated plot followed by Acc. 25 (5.73 t $ha^{-1}$) and the lowest in control (4.35 t $ha^{-1}$). Due to the incorporation of *dhaincha* biomass in soil, the rice grain yield increased 7.82% to 33.56% over the control. Among the *dhaincha* accessions, number 33 showed the best performance in terms of influencing grain yield. A precise conclusion to be built up through collection of large number of germplasms from Bangladesh is needed.

**Keywords:** *Dhaincha* incorporation; grain yield; rice; residual nutrient status.

# AGRONOMICAL AND TECHNOLOGICAL PERFORMANCES OF SOME EARLY COTTON CULTIVARS PLANTED AS SECOND CROP IN DIYARBAKIR CONDITION, TURKEY

**S. BASBAG, R. EKINCI**

**ABSTRACT.** The opportunity to increase agricultural areas is limited, so that increasing demands can be achieved by producing more products from existent agricultural areas. Second cropping is a sustainable practice in which more than one crop is grown consecutive on the same ground. This study was carried out to determine agricultural and technological properties of growing cotton (*Gossypium hirsutum* L.) as second crop on stubble of ridge planted wheat in Diyarbakır. The experiment was conducted in the experimental area of Dicle University Agricultural Faculty as randomize complete block design with three replications. Eight cotton varieties (Berke, Lachata, BA 119, STV 468, STV 373, Özbek 100, Fantom and DP 396) were used as material. Wheat, planting on ridge, was harvested approximately 10 cm above the soil surface June 12, 2012. Straws of harvested wheat were removed from the experimental area. Same day cotton varieties were planted two rows on each ridge. The results indicated that STV 468, Fantom and Berke in terms of seed cotton yield; Fantom, Berke in terms of fiber length; DP 396 and Berke interms of fiber strength had given the highest values. However, our study suggested that whether very earlier cotton varieties (Özbek 100, Berke and Fantom) are grown, cotton will be grown as second crop after ridge planted wheat in the stubble seedling under Diyarbakır ecological condition.

**Keywords:** cotton; stubble; yield; early maturity; sustainable practice.

# LOW ENVIRONMENTAL IMPACT METHOD FOR CONTROLLING THE PEACH FRUIT FLY, *BACTROCERA ZONATA* (SAUNDERS) AND THE MEDITERRANEAN FRUIT FLY, *CERATITIS CAPITATA* (WIED.), IN MANGO ORCHARDS IN EGYPT

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**ABSTRACT**. The study was carried out at two experimental farms in Ismailia Governorate, Egypt, during season of 2015 and 2016. GF-120 (Conserve® 0.024% CB) was selected in this study to evaluate its efficacy for controlling the peach fruit fly, *Bactrocera zonata* (Saunders) and the Mediterranean fruit fly, *Ceratitis capitata* (Wied.), on mango fruits by using partial bait spray and spots method. GF-120 was used as low environmental impact method and new way to control *B. zonata* and *C. capitata*, compared with malathion 57%, as traditional insecticide. During both seasons, data revealed that the number of *C. capitata* captured weekly from different treatments and untreated plots was higher than the number of *B. zonata* captured in both seasons of experiment. Data revealed that the number males of *B. zonata* and *C. capitata* captured weekly from sticky traps were lower in trees treated with GF-120 than malathion and untreated plots. In the farm of Faculty of Agriculture, Suez Canal University, the lowest percentages of infestation of both dropping and setting fruits per tree were recorded in plots treated with GF120 (spots), with an average of 25.14 and 17.022% for dropping fruits and 2.2 and 2.0% for setting fruits for 2015 and 2016 season, respectively. Data indicated that the all tested formulation under field condition caused significant reduction in the rate of infestation from 54.92 to 81.79 for both dropping and setting fruits. The lowest percentages of infestations in the private farm of both dropping and setting fruits per tree were recorded in GF-120 (spray treatment), with an average of 20.0, 12.12 for dropping fruits and 3.4 and 4.0 for setting fruits for 2015 and 2016 seasons, respectively.

**Keywords:** *B. zonata*; *C. capitata*; partial - spot spray; efficacy; infestation; monitoring; GF-120; malathion.

# *IN VITRO* PRODUCTION OF EMBRYOS AT RESEARCH AND DEVELOPMENT STATION FOR CATTLE BREEDING DANCU, IASI – FIRST BOVINE EMBRYOS PRODUCED *IN VITRO* IN NORTH-EASTERN ROMANIA

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**ABSTRACT.** The *in vitro* production (IVP) of bovine embryos increases the selection intensity in cattle and reduces the generation interval, which is very important in the genetic gain. In Romania, this reproductive biotechnology has shown a timid evolution in the last years, although the need for genetic improvement in the area is present. The aim of this paper is to describe the work that resulted in first bovine embryos obtained through IVP in North-Eastern Romania. Oocytes were collected by slashing ovaries from slaughtered cows, matured in a TCM199-based medium and fertilized in TL-based medium microdrops with sperm processed by swim-up procedure. The presumptive embryos were cultured one day in TCM199

and 8 days in SOF-based medium and evaluated in days 7, 8 and 9 after fertilization. We retrieved an average number of 83 usable oocytes/IVF session, which represents 73.8% from the total harvested oocytes. The average number of cleaved embryos was 50.8 per IVF, reflecting an average cleavage rate of 61.2%. An average of 8.6 blastocysts/IVF session was obtained, representing 10.4% of the selected oocytes or 16.9% of the number of cleaved embryos. Although suboptimal, the results were comparable with other reports on IVP in cattle. The adapted IVP protocol, based on maturation with TCM199, fertilization in microdrops of TL and culture of presumptive embryos one day in TCM199 and afterwards in SOF seems to offer acceptable results and will be used for further attempts to produce bovine embryos.

**Keywords:** IVP; TCM199 medium; TL medium; SOF medium; swim-up.

**REZUMAT. Producerea *in vitro* de embrioni în cadrul S.C.D.C.B. Dancu, Iaşi - primii embrioni bovini produşi *in vitro* în nord-estul României.** Producerea *in vitro* de embrioni bovini determină o creştere a intensităţii de selecţie a bovinelor şi o reducere a intervalului între generaţii, elemente importante în realizarea câştigului genetic. În România, această biotehnică de reproducere asistată la taurine a prezentat o evoluţie timidă în ultimii ani, deşi există o nevoie crescută în ceea ce priveşte ameliorarea şeptelului de bovine pentru lapte. Scopul acestui studiu este de a descrie rezultatele obţinute ca urmare a cercetărilor efectuate pentru producerea primilor embrioni *in vitro* la specia *Bos taurus* în zona de Nord-Est a României. Ovocitele au fost recoltate prin realizarea unor incizii multiple în corticala ovarelor provenite de la vaci sacrificate în abator, apoi maturate în mediul TCM 199 şi fertilizate în mediul TL, cu material seminal procesat prin metoda swim-up. Embrionii au fost apoi cultivaţi o zi în mediul TCM 199 şi 8 zile în mediul SOF, evaluarea lor făcându-se pe parcurs în zilele 7, 8 şi 9 după fertilizare. S-a obţinut o medie de 83 ovocite de bună calitate recoltate/sesiune fertilizare *in vitro* (FIV), ceea ce reprezintă 73,8% din totalul ovocitelor recoltate. Numărul mediu de embrioni divizaţi a fost de 50,8/sesiune FIV, ceea ce reflectă o rată de clivaj de aproximativ 61,2%. Din totalul acestora s-a obţinut un număr mediu de 8,6 blastocişti/sesiune FIV, reprezentând 10,4% din totalul ovocitelor selectate sau 16,9% din numărul de embrioni clivaţi. Deşi rezultatele nu sunt optime, pot fi comparate cu alte raportări privind producerea *in vitro* de embrioni bovini. Protocolul FIV utilizat, bazat pe maturarea ovocitelor în TCM 199, fertilizarea în picătura TL şi cultivarea embrionilor o zi în TCM 199, iar apoi în mediul SOF reprezintă o metodă care conferă rezultate acceptabile şi va fi utilizată pentru producerea de embrioni bovini în viitor.

**Cuvinte cheie:** FIV; mediul TCM199; mediul TL; mediul SOF; metoda swim-up.