

## АННОТАЦИИ. КЛЮЧЕВЫЕ СЛОВА. БИБЛИОГРАФИЯ

**Жуков А.В.** Экологические детерминанты влажности устойчивого увядания растений дерново-литогенных почв на лессовидных суглинках / **А.В. Жуков, И.В. Лядская, К.П. Масликова** // Вісник Дніпропетровського державного аграрно-економічного університету. – 2017. – № 2(44). – С. 12–16.

Определены показатели влажности устойчивого увядания растений дерново-литогенных почв на лессовидных суглинках расчетным методом и методом вегетационных мини-атюр. Установлено сходство между двумя методами. В дерново-литогенных почвах на лессовидных суглинках влажность устойчивого увядания растений варьирует от 5,33 до 13,19 %. Для исследованного типа техноземов характерны более низкий показатель влажности увядание растений в верхних слоях почвы и резкое его повышение в нижних, что свидетельствует о более уплотненном слое на глубине 30–40 см и ниже. Показано, что наибольшее влияние на влажность устойчивого увядания растений имеет засоленность почвы. Регрессионный анализ подтвердил, что оба метода исследований дают сходные результаты, а следовательно, построенные педотрансферные функции позволяют уменьшить потери труда при определении данной гидрологической константы и получить показатель, который имеет очевидную экологическую значимость.

**Ключевые слова:** влажность устойчивого увядания растений, техноземы, лессовидные суглинки, рекультивация.

**Гамаюнова В.В.** Особенности водопотребления пшеницы озимой в зависимости от сорта, места в севообороте и удобрений в южной Степи Украины / **В.В. Гамаюнова, А.О. Литовченко** // Вісник Дніпропетровського державного аграрно-економічного університету. – 2017. – № 2(44). – С. 17–21.

Приведены данные по влиянию сортовых особенностей, предшественника, фона питания и погодно-климатических условий вегетационного периода на суммарное водопотребление пшеницы озимой, показаны пути повышения эффективности использования почвенной влаги и атмосферных осадков для формирования более высокой зерновой продуктивности культуры в условиях южной Степи Украины.

**Ключевые слова:** пшеница озимая, сорта, предшественник, фон питания, суммарное водопотребление, коэффициент водопотребления, условия вегетационного периода.

**Григоришин Е.В.** Эффекты предпосевной обработки семян эхинацеи бледной на морфометрические показатели / **Е.В. Григоришин** // Вісник Дніпропетровського державного

аграрно-економічного університету. – 2017. – № 2(44). – С. 22–29.

Установлены закономерности варьирования морфометрических признаков растений эхинацеи бледной, выращенных из семян, подвергнутых обработке экологически безопасными стимуляторами роста. Показано, что предпосевная обработка семян проявляется в различиях морфометрических признаков, определяющих урожайность этой культуры. Определено, что наибольший стимулирующий эффект на высоту и массу стеблей, массу листьев имеет предварительная обработка семян наномиксом или УВЧ-облучением. Количество стеблей не зависит от способов предпосевной обработки семян. Характер влияния стимуляторов на высоту стеблей, массу и количество листьев подобный в различные годы, а влияние на массу стеблей имеет межгодовые особенности. Влияние гумата или смеси гумата и наномикса может не проявлять себя в морфометрических показателях растений или даже их подавлять.

**Ключевые слова:** эхинацея бледная, стимуляторы, наномикс, морфометрия, предпосевная обработка.

**Ткалич Ю.И.** Эффективность применения гербицида Гвардиана тетра в посевах кукурузы / **Ю.И. Ткалич** // Вісник Дніпропетровського державного аграрно-економічного університету. – 2017. – № 2(44). – С. 30–34.

Приведены результаты полевого опыта по изучению фитотоксической эффективности применения гербицидов на посевах кукурузы. Показано, что самая высокая урожайность в опытах зафиксирована на контроле с ручной прополкой сорняков – 6,97 т/га. К такому показателю приближались варианты с применением гербицида Гвардиан Тетра под предпосевную культивацию. Его использование, как послевходового, приводило к недобору урожая на уровне 0,4 т/га. Внесение препарата Харнес не обеспечивало полного уничтожения сорняков, что снижало урожайность на 1,26 т/га в сравнении с контролем.

**Ключевые слова:** кукуруза, техническая эффективность, структура урожая, урожайность, гербициды, сорняки.

**Любич В.В.** Хлебопекарные свойства зерна сортов пшеницы мягкой в зависимости от видов, норм и сроков внесения азотных удобрений / **В.В. Любич** // Вісник Дніпропетровського державного аграрно-економічного університету. – 2017. – № 2(44). – С. 35–41.

Приведены результаты изучения содержания белка, клейковины в зерне пшеницы озимой, объема хлеба и его кулинарной оценки в зависимости от погодных условий, сорта видов, норм и сроков внесения азотных удобрений.

## АННОТАЦИИ. КЛЮЧЕВЫЕ СЛОВА. БИБЛИОГРАФИЯ

Установлено, что эффективность удобрения меняется и зависит от сорта пшеницы озимой. Внесение полного минерального удобрения (фон + N<sub>120</sub>) способствовало повышению содержания белка на 15 %, однако более высокое его значение получено при дробном использовании азотных удобрений. Содержание клейковины в зерне сорта Артемисия было существенно выше, чем у сорта Тронка, а с дробным внесением азотных удобрений составило 47,9–49,0 %. Зерно пшеницы озимой сорта Тронка в вариантах с применением азотных удобрений характеризовалось более высокой хлебопекарной оценкой (8,6 балла), чем сорт Артемисия (7,6 балла).

**Ключевые слова:** пшеница озимая, сорт, азотные удобрения, хлебопекарные свойства.

**Цилюрик А.И.** Биологическая активность почвы при различных способах ее обработки и удобрения в посевах подсолнечника / **А.И. Цилюрик, А.Ф. Кулик, Н.В. Гончар** // Вісник Дніпропетровського державного аграрно-економічного університету. – 2017. – № 2(44). – С. 42–48.

Установлена тенденция к повышению активности разложения льняного полотна при плоскорезной обработке и чизелевании на неудобренных вариантах в связи с лучшими условиями аэрации, увлажненности почвы и более глубокой заделкой растительных остатков. Мелкое дискование приводит к торможению микробиологической активности и нитрификации вследствие ухудшения агрофизических свойств пахотного слоя и локализации в ограниченной почвенной среде большого количества пожнивных остатков.

**Ключевые слова:** подсолнечник, биологическая активность почвы, растительные остатки, обработка почвы, минеральные удобрения, урожайность, экономическая эффективность.

Витамины группы Р как маркеры дефицита природных регуляторов онтогенеза зерновых культур / **Я.В. Степневская, А.С. Боброва, В.Т. Сметанин, Н.И. Кашкальда** // Вісник Дніпропетровського державного аграрно-економічного університету. – 2017. – № 2(44). – С. 49–52.

Обсуждается влияние витаминов группы Р как маркеров дефицита природных регуляторов онтогенеза у различных видов культурных растений на всхожесть и морфологические характеристики проростков зерновых культур, среди которых тритикале, пшеница и овес. Показана возможность использования биофлавоноидов как специфических маркеров в разработке биотехнологий выращивания сельскохозяйственных культур, в про-

цессе селекции адаптивных сортов зерновых культур, а также в технологии микроклонального размножения растений *in vitro*. Утверждается эффективность использования растворов рутина для предпосевной обработки семян тритикале, пшеницы и овса, даже с незначительными повреждениями эндосперма. **Ключевые слова:** биофлавоноиды, рутин, тритикале, пшеница, овес, всхожесть, морфологические характеристики проростков.

Эффективность использования соединений гуминовой природы в рационах перепелов / **А.В. Гунчак, Л.М. Степченко, И.Б. Ратич, О.М. Стефаньшин** // Вісник Дніпропетровського державного аграрно-економічного університету. – 2017. – № 2(44). – С. 53–57.

Обсуждаются результаты применения гуминовой кормовой добавки в рационах перепелов. Установлено, что “Гумилид”, при условии его оптимального введения, положительно влияет на функциональное состояние организма птицы, интенсифицирует процессы пищеварения и белкового синтеза, повышает сердечносуточные приросты массы тела и яйценоскость перепелок. Исследована возрастная динамика показателей белкового обмена и активности гидролитических ферментов в тканях поджелудочной железы и слизистой оболочки двенадцатиперстной кишки перепелов при добавлении биогенной добавки.

**Ключевые слова:** перепелки, гуминовые вещества, гидролитические ферменты, белковый обмен, яйценоскость.

**Бенселгуб А.М.** Экологическая оценка техногенного загрязнения почв в индустриальном регионе Аннаба (Алжир) / **А.М. Бенселгуб, Н.Н. Харитонов, Л.В. Шупранова** // Вісник Дніпропетровського державного аграрно-економічного університету. – 2017. – № 2(44). – С. 58–61.

Главными загрязнителями почв в регионе Аннаба являются свинец, марганец, цинк и никель. Самое высокое азротехногенное загрязнение почв тяжелыми металлами зафиксировано на расстоянии 2–4 км от сталелитейного комбината Эль Хаджар. Контролем при расчетах суммарного показателя загрязнения почв служили показатели загрязнения почв тяжелыми металлами в зоне аэропорта. Степень техногенного загрязнения в 3–5-километровой зоне вблизи металлургического завода Эль Хаджар и в центральной части г. Аннаба оценивается как умеренно опасная. Сопоставление значений изоэлектрических точек изопероксидаз выявило качественные и количественные отличия в электрофоретических спектрах белков 4-суточных корней проростков редиса, выращенного на почвах с разным уровнем техногенного загрязнения.

## АННОТАЦИИ. КЛЮЧЕВЫЕ СЛОВА. БИБЛИОГРАФИЯ

Самый высокий уровень активности пероксидазы зарегистрирован в листьях растений, выращенных в непосредственной близости от металлургического завода Эль Хаджар.

**Ключевые слова:** окружающая среда, тяжелые металлы, индустриальный регион, индекс загрязнения.

**Пичура В.И.** Зональные закономерности вековых изменений климата на территории бассейна р. Днепр / **В.И. Пичура** // Вісник Дніпропетровського державного аграрно-економічного університету. – 2017. – № 2(44). – С. 62–73.

Представлены результаты исследования зональных (Степь, Лесостепь и зона смешанных лесов) закономерностей многолетних изменений климатических условий за последние 200 лет на территории трансграничного бассейна реки Днепр с применением методов многомерной статистики и ГИС-технологий. В трех физико-географических зонах наблюдается стремительное повышение среднегодового значения температуры воздуха с конца 80-х годов до настоящего времени на 1,0–1,2 °С. Наибольшая доля аномальных изменений в температурном режиме приходится на Степь и смешанные леса, а наибольшая вероятность аномальных изменений осадков регистрируется в Лесостепи. Пространственно-графическим анализом выявлены снижение сезонной вариабельности температурного режима в направлении с запада на восток и восходящая синусоидальная зависимость повышения температуры воздуха с северо-востока (истока реки) к южной части (устье реки) в 2,6 раза. Пространственное тренд-циклическое повышение осадков происходит с южной к северной части трансграничного бассейна.

**Ключевые слова:** климат, температура воздуха, атмосферные осадки, зональные закономерности, бассейн р. Днепр, многомерная статистика, моделирование, ГИС-технологии.

**Рудаков Л.Н.** Испарение с водной поверхности регулирующих бассейнов оросительных систем / **Л.Н. Рудаков, Г.В. Гапич, И.В. Чушкина** // Вісник Дніпропетровського державного аграрно-економічного університету. – 2017. – № 2(44). – С. 74–77.

Представлены результаты расчетов испарения с водной поверхности регулирующих бассейнов оросительных систем Царичанского межрайонного управления водного хозяйства. Проведено сравнение приходной и расходной частей уравнения водного баланса для регулирующих бассейнов. Установлены периоды снижения и повышения уровней воды в бассейнах. Установлено, что за поливной сезон с трех бассейнов общей

площадью более 20 тыс. м<sup>2</sup> и объемом воды около 80 тыс. м<sup>3</sup> испаряется около 1 тыс. м<sup>3</sup> (в среднем 3,5 % от общих потерь). Другая часть потерь относится к фильтрационным, что свидетельствует о низком уровне коэффициента полезного действия системы и неудовлетворительном техническом состоянии исследуемых объектов.

**Ключевые слова:** регулирующий бассейн, оросительная система, испарение с водной поверхности, атмосферные осадки, температура воздуха, потери воды.

**Миронов А.С.** Определение влажности, плотности, твердости почвы в полевых условиях / **А.С. Миронов, Е.В. Золотовская, А.А. Мищенко** // Вісник Дніпропетровського державного аграрно-економічного університету. – 2017. – № 2(44). – С. 78–82.

Приведены результаты экспериментальных исследований по накоплению влаги в почве. Выполнена обработка экспериментальных показателей температур на поверхности и в глубине почвы. Построена диаграмма зависимости относительной влажности на поверхности почвы, плотности, твердости почвы от отношения температур на поверхности и в глубине почвы, которая дает возможность определять закономерность образования почвенной влаги, прогнозировать водные и тепловые свойства почвы. Использование оценки теплофизического состояния почвы позволяет оперативно принимать оптимальные решения по обработке почвы, управлять формированием урожая выращиваемых культур.

**Ключевые слова:** относительная влажность, плотность, твердость, градиент температур, диаграмма влажности, обработка почвы.

Эксплуатационные свойства композитных материалов “силикагель – сульфат натрия” и “силикагель – ацетат натрия” для солнечных адсорбционных тепловых насосов / **Е.В. Коломиец, Е.А. Беляновская, И.В. Сухая, М.П. Сухой, К.М. Сухой, Е.М. Прокопенко** // Вісник Дніпропетровського державного аграрно-економічного університету. – 2017. – № 2(44). – С. 83–86.

Исследованы эксплуатационные свойства композитных сорбентов “силикагель–натрий сульфат” и “силикагель–натрий ацетат”, которые синтезированы золь-гельметодом, для адсорбционных солнечных тепловых насосов. Показаны качественные различия кинетических кривых сорбции воды композитными сорбентами и массивными солями: почти линейный начальный участок кинетической кривой в координатах адсорбция–квадратный корень времени для ком-

## АННОТАЦИИ. КЛЮЧЕВЫЕ СЛОВА. БИБЛИОГРАФИЯ

позитных сорбентов и S-образная форма для массивных солей, которая является типичной для гидратации в кинетическом режиме. Установлено, что гидратация композитных сорбентов при 20–60 °С протекает в диффузионном режиме, т. е. лимитирующим фактором является транспорт воды по системе пор сорбента. Вычислены энергии активации процесса диффузии, которые составляют около 52 кДж/моль для композита “силикагель–натрий сульфат” и 64 кДж/моль для композита “силикагель–натрий ацетат”. Разработана конструкция солнечного адсорбционного теплового насоса. Установлены коэффициенты преобразования теплоты предложенного теплового насоса при использовании композита “силикагель–сульфат натрия” 2,084 и “силикагель–ацетат натрия” 2,021. Выявлена сезонная зависимость эксплуатационного коэффициента преобразования теплоты адсорбционного теплового насоса на основе композитов “силикагель–натрий сульфат” и “силикагель–натрий ацетат”. Установлена корреляция коэффициентов преобразования теплоты для адсорбционного теплового насоса и свойств использованных сорбентов (сорбционной емкости и температуры регенерации). Показана перспективность его использования в системах теплоснабжения, которая обусловлена его независимостью от традиционных источников энергии и экологическими преимуществами.

**Ключевые слова:** композитные сорбенты, сорбционная емкость, температура регенерации, солнечный адсорбционный тепловой насос, энергоэффективность.

**Лимонт А.С.** Статистическая оценка распаханности сельскохозяйственных угодий и урожайность льна-долгунца / **А.С. Лимонт** // Вісник Дніпропетровського державного аграрно-економічного університету. – 2017. – № 2(44). – С. 87–92.

Проанализированы распаханность сельскохозяйственных угодий крупнотоварных аграрных формирований Житомирского Полесья, концентрация посевов льна-долгунца, в которых, в годы установившегося и интенсивного развития льноводства в Украине, колебалась в пределах 4,2–13,6 %. Среднее арифметическое значение и среднее квадратическое отклонение эмпирического распределения распаханности анализируемых предприятий составляли соответственно 65,5 и 9,75 %. По показателям асимметрии и эксцесса эмпирическое распределение распаханности сельхозугодий несущественно отклонялось от нормального. С повышением распаханности от 38,2 до 83,1 % урожайность семян и волокна льна-долгунца

возрастает с постепенным замедлением по определенным гиперболическим зависимостям.

**Ключевые слова:** сельскохозяйственные угодья, распаханность, лен-долгунец, урожайность, семена, волокно, корреляция, уравнения регрессии.

Моделювання технологічних процесів ґрунтообробних машин / **Г.В. Теслюк, Б.А. Волик, А.Н. Кобец, Пугач А.Н.** // Вісник Дніпропетровського державного аграрно-економічного університету. – 2017. – № 2(44). – С. 93–97.

Систематизирован опыт проведения модельных исследований рабочих органов почвообрабатывающих машин. Обосновано минимально необходимое количество параметров, которые необходимо принять при установлении критериев подобия для орудия. Отмечено, что масштабирование часто изменяет физику исследуемых процессов, особенно в случае, если речь идет об активных рабочих органах. Поэтому в работе аргументирована целесообразность перехода на групповые критерии подобия, которые позволяют учитывать взаимное влияние параметров друг на друга. Доказана возможность использования гидродинамического моделирования для определения проблемных участков режущего периметра орудия с точки зрения прохождения почвенного потока. За основу метода принята соответствие составляющих уравнений И. Бернулли и В.П. Горячкина.

**Ключевые слова:** гидродинамическое моделирование технологических процессов, критерии подобия, π-теорема, масштабный коэффициент.

**Васильева Н.К.** Вычислительные аспекты нелинейных моделей оптимизации в аграрном секторе экономики / **Н.К. Васильева** // Вісник Дніпропетровського державного аграрно-економічного університету. – 2017. – № 2(44). – С. 98–102.

Расширены вычислительные возможности свободных программных средств для выполнения расчетов в нелинейных моделях оптимизации деятельности в аграрном секторе экономики. Прикладную апробацию математических выкладок проведено для модели распределения посевов ведущих зерновых культур Украины с целью обеспечения максимального общего уровня рентабельности их производства в системе продовольственной безопасности.

**Ключевые слова:** аграрный сектор, нелинейная модель оптимизации, свободные программные средства, зерновые культуры, рентабельность.



## АННОТАЦИИ. КЛЮЧЕВЫЕ СЛОВА. БИБЛИОГРАФИЯ

**Самарец Н.Н.** Эконометрическое моделирование на аграрном рынке продукции овощеводства / **Н.Н. Самарец** // Вісник Дніпропетровського державного аграрно-економічного університету. – 2017. – № 2(44). – С. 103–108. Рассмотрено построение эконометрических моделей зависимостей объемов производства и потребления продукции овощеводства в Днепропетровской области от факторов, которые наиболее существенно на них влияют: средних цен реализации овощей, их урожайности, объемов производства и потребления овощей на одного человека в год, средней заработной платы. На основе выборочных статистических данных построены адекватные парные линейные и нелинейные, а также множественные регрессионные уравнения. По результатам моделирования оценена взаимосвязь факторов и проанализированы предельные приросты, коэффициенты эластичности, относительные показатели качества прогноза и сила влияния каждого фактора на исходную функцию.

**Ключевые слова:** продовольственная безопасность, моделирование, регрессионный анализ, статистическая значимость, производство, потребление, овощеводство.

**Васильева Л.Н.** Деловая репутация предприятия как объект бухгалтерского учета / **Л.Н. Васильева, Н.В. Бондарчук** // Вісник Дніпропетровського державного аграрно-економічного університету. – 2017. – № 2(44). – С. 109–112.

Определено, что деловая репутация принципиально новый объект бухгалтерского учета, который характеризуется как нематериальная, особенная, уникальная природа данного объекта; существует причинно-следственная связь между наличием у предприятия деловой репутации и его конкурентными преимуществами. Проанализированы понятия “гудвилл” и “деловая репутация”. Сформулирован ряд мероприятий по формированию в бухгалтерском учете информации о приобретенной деловой репутации и ее отражение в бухгалтерской финансовой отчетности, а также корректировки состава и корреспонденции счетов, используемых для отображения данных фактов.

**Ключевые слова:** бухгалтерский учет, гудвилл, деловая репутация, нематериальный актив.

Формирования сбытовой маркетинговой стратегии хлебобулочной продукции / **Л.Н. Курбацкая, И.Г. Кадырус, Т.В. Ильченко, Ю.В. Захарченко** // Вісник Дніпропетровського державного аграрно-економічного університету. – 2017. – № 2(44). – С. 113–116. Обоснованы особенности формирования сбытовой маркетинговой стратегии хлебобу-

лочной продукции, которая позволит с достаточной степенью точности и достоверности спрогнозировать (учесть) тенденцию развития производственно-сбытовой деятельности аграрного предприятия. Предложены, кроме качественного состава продукции, которая ценится конечным потребителем, другие факторы обеспечения актуализации информационного контента для конечного потенциального потребителя за счет повышения эффективности маркетинговых мероприятий через формирование предварительного спроса во время, которое определяется точкой невозврата, и со смещением акцента на временную составляющую, которая является синхронизированной по времени с акцией информационного взаимодействия с потенциальными потребителями.

**Ключевые слова:** аграрный маркетинг, сбытовая стратегия, хлебобулочная продукция.

**Мороз С.И.** Использование информационных технологий в маркетинге / **С.И. Мороз, И.И. Шрамко** // Вісник Дніпропетровського державного аграрно-економічного університету. – 2017. – № 2(44). – С. 117–122.

Проанализированы основные информационные технологии и программные средства, используемые аграрными предприятиями при сборе и анализе маркетинговой информации, составлении планов и прогнозов, организации продвижения и сбыта. Предложено включать в информационные системы аграрного маркетинга свободнораспространенное программное обеспечение, веб-сервисы и мобильные приложения. Утверждается, что перспективным трендом развития информационных технологий является использование различных портативных устройств и приложений на основе 3G технологий. Полученные результаты могут быть использованы для совершенствования инструментария аграрного маркетинга.

**Ключевые слова:** информация, информационные технологии, программное обеспечение, веб-сервисы, аграрный маркетинг.

**Демьяненко И.В.** Финансово-кредитные отношения обеспечения инвестиционно-инновационного развития агросферы / **И.В. Демьяненко, А.В. Буряк** // Вісник Дніпропетровського державного аграрно-економічного університету. – 2017. – № 2(44). – С. 123–128.

Рассмотрены теоретико-методологические аспекты современной научной парадигмы расширенного общественного воспроизводства и его движущего фактора – инвестиционно-инновационного процесса. Уточнена экономическая сущность инвестирования как процесса приумножения совокупного капитала предприятий за счет дополни-

## АННОТАЦИИ. КЛЮЧЕВЫЕ СЛОВА. БИБЛИОГРАФИЯ

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тельного вложения основного и оборотного капитала. Признано необходимым совершенствование с этой целью системы финансово-кредитных отношений агропроизводителей и предприятий пищевой промышленности; выявлены положительные тенденции в этой сфере и возможности дальнейшего развития.

**Ключевые слова:** расширенное общественное воспроизводство, инвестиционно-инновационный процесс, финансово-кредитные отношения, эндогенные финансовые ресурсы, кредиты.

**Олейник Т.** Внутренний экономический механизм формирования и воспроизводства основных средств предприятия / **Т. Олейник** // Вісник Дніпропетровського державного аграрно-економічного університету. – 2017. – № 2(44). – С. 129–133.

Рассмотрены теоретико-методологические аспекты осуществления комплекса мероприятий относительно создания внутреннего экономического механизма формирования и воспроизводства основных средств предприятия. Уточнена экономическая сущность и значение начисления амортизации с точки зрения формирования внутренних финансовых возможностей для воспроизводства основных средств путем создания амортизационного фонда предприятия. С этой целью необходимо использовать амортизационные накопления по критерию максимизации текущей стоимости денежных потоков, которые через капитальные вложения воплотятся в прирост производства продукции.

**Ключевые слова:** основные средства, воспроизводство, амортизационный фонд, прибыль, денежные потоки, капиталовложения, рабочий капитал, прирост продукции.

## ABSTRACTS. REFERENCES. KEYWORDS

### **Ecological determinants of humidity of persistent plant wilting in soddy-lithogenic soils on forest loam (p. 12–16)**

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**Raising of problem.** The steppe zone of Ukraine is characterized by the high concentration of enterprises of ferrous and colored metallurgy. At getting of ores of thousand hectares of the most valuable earth lost during openwork. Problem of proceeding in the ground cover broken because of industrial activity, very sharply stands in the districts of mining. For renewal and return of the broken earth in the agricultural use conduct recultivation that envisages creation in place of exhaust quarries of the artificial ground cover. The special value is acquired by a task to monitoring of water-physical properties of soil as to custom of proceeding in the ecological functions of the ground cover a process control in the process of recultivation. For plants all ground not moisture is accessible, but only and her part, that is contained in soil by forces, less than, than suction force of root hairsprings. A lower limit of availability is humidity of the proof fading of plants. This size is exceptionally important by description and sign of dynamics of proceeding in the broken earth. Loess loams are considered most agronomical a valuable maternal breed. They are characterized by friendly to many agricultural cultures physical properties: by the high coefficient of structuralness, relatively by the optimal closeness of drafting, interparticle, permeability to water. An important problem is development of the methodical going near establishment of ecologically reasonable indexes of humidity of the proof fading of soils that is formed in the process of agricultural recultivation and Loess loams. The aim of our research is to define the indexes of humidity of fading of plants of Sod-lithogenic soils on Loess loams a calculation method and method of vegetation miniatures and to estimate reasons of divergences of these approaches.

**Materials and research methods.** Works are conducted on an experimental area from recultivation of earth, that is on research permanent establishment of the Dnepropetrovsk state agrarian-economic university. The standards of soil took away on the layers of 0–10, 10–20, 90–100 cm from the stopped up cut in Sod-lithogenic soil on Loess loams in triple repeated. Taking away of tests is conducted in June–July, 2014. On the basis of size of maximal hygroscopic humidity expected humidity of fading of plants, accepting the translated coefficient 1,34 – after instruction of hydro meteorological service. Except the calculation of humidity of fading of plants on maximal hygroscopic humidity, applied the method of direct determination of index by growing of plant-

lets in drying glasses and leading to of them to complete fading.

**Research results.** The analysis of the obtained data testifies that the estimations of humidity of fading of plants of soil on the Loess loams got a calculation method vary from  $6,54 \pm 0,31$  (a layer is a 0–10 cm) to  $12,66 \pm 0,19$  (layer a 90–100 cm). Between the estimations of humidity of fading of plants a calculation method and method of miniatures is statistically reliable cross-correlation connection ( $r = 0,98$ ,  $p = 0,00$ ). Difference between estimations by two methods always positive, that testifies that for the investigational type of tehnozem a calculation method gives understating of estimation, than ecologically correct method of miniatures. One of explanations of such difference Salinization of the ground layer can come forward

**Discussion.** The water mode is a key factor that determines the productivity of agroecosystems in the conditions of Steppe of Ukraine. The range of accessible moisture in soil depends on the least moisture-capacity and humidity of fading of plants and determined as a difference between these hydrological constants. Humidity of fading of plants in a most degree depends on grain-size distribution of soil: easy soils are characterized by the less value of it to the index, and more heavy – higher. For this reason the worked out method of determination of humidity of fading of plants for agrozems is based on the count of maximal hygroscopicity by means of universal to the coefficient 1,34 (or 1,5). More ecologically reasonable approach of determination of humidity of fading of plants is a method of miniatures. He is based on direct supervisions on the state plants at the terms of change of humidity of standard of soil. It should be noted that except grain-size distribution on the value of humidity of fading of plants the concentration of salts influences in the ground solution. Results got in the real article also specify on the large informative value of data for mineralization of the ground solution. A new result is establishment of informative role of depth of soil as Predictor of the real value of humidity of the proof fading plants.

**Conclusion.** The got results testify that a calculation method and method of miniatures give the strongly correlating estimations of humidity of the proof fading of plants sufficiently. Index of fading humidity, that is got the method of miniatures is ecologically reasonable, so as directly represents the physiology state of plants depending on content of moisture in soil.

**Keywords:** moisture resistant wilting plants tehnozems, lesopodibni loam, reclamation.

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### **Special aspects of water consumption of winter wheat according to species, place in crop rotation and fertilizers in southern Steppe of Ukraine (p. 17–21)**

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The article represents the results of studies of five species of winter wheat (Albatros odesskiy (St), Selyanka, Kuyalnik, Viktoriya odesskaya, Yermak). The studies were made on southern chernozem during four years which were varied by weather conditions of vegetation period. Studies were made in such crop rotation as winter wheat was cultivated after three preceding crops such as black fallow, maize for silage and winter wheat. Species of winter wheat were sown in two backgrounds such as natural background of preceding crop and background of preplanting application of fertilizers and top dressing.

It was found that winter wheat crops more effectively used deposits of soil moisture and precipitations of vegetation period under optimization of nutrient background and selecting of the best preceding crops. In fact, on average of studies year it was used 1312 m<sup>3</sup> of water for forming 1 ton of grain with corresponding amount of by-products and it was used 940 m<sup>3</sup> of water for such purposes after application of mineral fertilizers followed black fallow. It was used on average 2090 and 1163 m<sup>3</sup> of water for cultivating of all species after maize for silage and it was used on average 2190 and 1149 m<sup>3</sup> of water accordingly for cultivating after winter wheat. Therefore with improvement of nutrient background the coefficient of water consumptive use decreased after preceding crops by 39,6; 79,7 and 90,6 %.

It is important for conditions of southern steppe of Ukraine.

Implementation of developed elements of technology and selecting of productive species adapted for climatic zone will give opportunity for optimizing water consumptive use independently of climatic conditions of year and substantially increasing total yields of winter wheat grain.

**Keywords:** winter wheat, varieties predecessor, von supply, total water consumption, water consumption rate, the terms of the growing season.

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### **Effects of seed treatment echinacea pale on morphometric indicators (p. 22–29)**

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In the work of the regularities of variation in morphometric traits of plants of echinacea, pale



## ABSTRACTS. REFERENCES. KEYWORDS

seeds grown under ecologically safe handling growth stimulants. It has been proven that seed treatment affects the growth and development of plants of echinacea pale so that this influence is evident in the differences in morphometric traits that determine the productivity of this culture. Such discrete predictors, as a way of processing, interannual characteristics and their interaction are able to statistically explain 55, 53, 7, 22 and 34 % of the variation in plant height, the number and mass of stalks, quantity and mass of leaves, respectively. Found that the greatest stimulating effect on the height and weight of stems, leaf mass is Nanomix seed pretreatment or ultra-high-frequency irradiation. The number of stems does not depend on seed treatment methods. The nature of the effects of stimulants on height, weight and number of stems leaves similar in different years, and the influence on the mass of stems has inter-annual features. The effect of Humate or mixture of Humate and Nanomix may not manifest itself in morphometric indicators plants, or even lead to their suppression.

**Keywords:** Echinacea pallida, stimulants, Nanomix, morphometry, seed treatment.

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### Effectiveness of tertra guardian herbicide application in maize production (p. 30–34)

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The paper presents the results of field experiment for the study of phytotoxic effectiveness of Guardian Tetra and Harness herbicides produced by Monsanto Company applied in maize. The experiment was carried out in 2013–2015 In the fields of “Dnipro” experimental farm of the Institute of Agriculture of the Steppe Zone of the National Academy of Sciences of Ukraine. The soil cover of the test plot consisted of ordinary

## ABSTRACTS. REFERENCES. KEYWORDS

low-humic full-profile chernozem. The experiment was replicated three times. The accounting area of the plot was 50,4 m<sup>2</sup>.

Dicotyledonous weeds were the main phytocenosis-forming elements making up 87% in the structure of weed synusia while the portion of bluegrass was 23 %.

The application of Guardian Tetra herbicide had a positive effect on the height and leaf area of maize. For example, when using the herbicide with presowing cultivation, the height of maize plants in the 13-14 leaf stage increased by 77 cm compared to control 2, and this index also increased in the tassel stage by 84 cm. The leaf area was also increased by 47,6 % and 52,9 %. However, application of Harness herbicide significantly reduced the height and leaf area of maize plants. In these plots, the maize height in the tassel stage was almost 30 cm lower than in control with manual withdrawal of weeds. The highest yield in the experiments was recorded on the control with manual withdrawal of weeds – 6,97 t/ha. The options with application of Guardian Tetra herbicide during pre-sowing cultivation neared this level with a yield of 6,82 t/ha, but its post-emergence application resulted in the reduction of yield at the level of 0,4 t/ha. The over-the-top application of Harness herbicide alone in the maize production technology did not ensure complete weed control; therefore, the yield was reduced by 1,26 t/ha compared to control 1. The lowest yield was gathered from the test plot left without weed control 3,49 t/ha.

Thus Guardian Tetra herbicide should be used with pre-sowing cultivation in the technology of maize yield potential protection (3,5 L/ha) as it is able to control weeds in maize almost completely during the growing season. It is also advisable to be applied in the 3–5 leaf stage, but at the same time the technical efficiency of the preparation decreases (88 %) and the yield decreases by 8 % in comparison with the control without weeds.

**Keywords:** corn, technical efficiency, yield structure, yield, herbicides, weeds.

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### ***Baking properties of grain of winter wheat varieties depending on types, rules and terms of the application of nitrogen fertilizers (p. 35–41)***

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Results of studying protein and gluten content in winter wheat grain, bread volume and its culinary assessment depending on weather conditions, varieties, types, rules and terms of the application of nitrogen fertilizers are shown. It is found that the efficiency of fertilizing varies depending on the variety of winter wheat. On average over three years of research the protein content increased from 11,4 % in the variant without fertilizers to 12,7–12,8 % by applying phosphorus, nitrogen and potash and nitrogen fertilizers or by 11–12 %. Applying a complete mineral fertilizer (ground + N<sub>120</sub>) has contributed to its content by 15 % but the highest protein content was obtained by the retail application of nitrogen fertilizers. Thus, the application of N<sub>60</sub>+N<sub>60</sub> on the ground P<sub>60</sub>K<sub>60</sub> increased protein content to 13,3 % or by 17 % and in the variant ground+N<sub>60</sub>S<sub>70</sub>+N<sub>60</sub> it increased to 13,9 % or by 22 %. By the protein content Artemisia variety grain significantly exceeded Tronka variety grain but change patterns were similar. Thus, in the unfertilized soil its content was 17,3 % and increased to 22,3 % in the variant ground+N<sub>60</sub>S<sub>70</sub>+N<sub>60</sub> or by 29 %.

In winter wheat grain of Tronka variety in the unfertilized soil the gluten content was 25,3 % which increased to 28,4 % in the variant ground+N<sub>120</sub> or by 12 % and when applying N<sub>60</sub>S<sub>70</sub>+N<sub>60</sub> it increased to 30,3 % or by 20 %.

Gluten content in Artemisia variety grain was significantly higher compared with Tronka variety grain. On average over three years of research it was 38,0% in the variant without fertilizers and in variants with a single nutrition of nitrogen fertilizers it was 45,1–46,2 % and with the retail application of nitrogen fertilizers it was 47,9–49,0 %.

## ABSTRACTS. REFERENCES. KEYWORDS

The culinary assessment of bread made of flour of Tronka variety grain increased with the improved nitrogen nutrition. Thus, the culinary assessment of color and surface of bread crust made of flour of Tronka variety grain in the variant without fertilizers accounted for 7,0 points and increased to 9,0 points in the variants with the retail application of nitrogen fertilizers. Size of pores, taste and aroma was from 7,7 to 9,0 respectively, flexibility and consistency was from 8,3 to 9,0 points. The color of pulp and uniform placement of pores did not change depending on fertilizing and was 9 points. The total culinary assessment of bread made of flour of Artemisia variety grain was not dependent on fertilizing.

Winter wheat grain of Tronka variety in variants with the application of nitrogen fertilizers is characterized by the highest culinary assessment (8,6 points) compared with Artemisia variety grain (7,6 points).

**Keywords:** winter wheat, variety, nitrogen fertilizers, baking properties.

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### Biological activity of soil at various methods of soil tillage and fertilising in sunflower crops (p. 42–48)

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It is established, that the soil microflora activity in the first place depends on direct proportion from the moisture conditions of the arable layer (0–30 cm), applied chemical fertilizers and soil aeration. The tendency to rising of decomposition of the flax linen with mouldboard soil tillage on unfertilized variants, in connection with the best conditions of aeration, and more buried dressing of plant residues is noted.

The use of by-products of predecessor without application of fertilization led to a decrease in biological activity of soil and content of nitrate nitrogen in 0–30 cm layer at mulching soil tillage compared with ploughing an average on 1,0–2,2 mg/kg.

In the variant of placement of straw together with fertilizers ( $N_{30}P_{30}K_{30}$ ,  $N_{60}P_{30}K_{30}$ ) it is registered positive changes of nitrogenous status of chernozem in time at chiseling and subsurface cultivator tillage connected with appropriated level of soil moistening and development of remobilization processes of nitrates.

Shallow disking leads to inhibition of nitrification due to deterioration of agrophysical properties of arable layer and localization of a large number of crop residues in a restricted medium.

It has been found, that the use of shallow soil mulching tillage (chiseling, loosening with subsurface cultivator) in sunflower provides approximately the same yielding capacity of seeds and enables to improve the figures of the economic production of oil-bearing seeds, to raise the level of production profitability by 12–15 % and recouplement of one hryvnia production costs from 2,32 to 2,44–2,74, to increase the energy coefficient from 3,01 to 3,19–3,20 and also to save a fuel 12,3–13,8 l/ha.

**Keywords:** sunflower, biological activity of soil, crop residues, soil tillage, fertilizers, yielding capacity, economic efficiency.

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### **Vitamins of group P as markers of deficiency of natural regulators of ontogenesis of grain-crops (p. 49–52)**

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The necessity of speeding up the process of obtaining adaptive varieties of crops that can be done using special substances – markers that allow us to find the most stable, productive and environmentally plastic lines without complex biochemical and genetic studies to this class of natural substances include vitamins P.

Objectives. The influence of vitamin P, as a token of scarcity of natural regulators of the ontogenesis of different types of cultivated plants, germination and the morphological characteristics of seedlings of cereal crops such as triticale, wheat and oats.

Materials and methods. The seed were couched in the conditions of laboratory at an optimal tem-

perature +20–22 °C and access of oxygen in rolls from a filtration paper on the distilled water (control) and in solutions of rutins of concentration 5·10<sup>-5</sup> mol/L, at an pH 5,7–6,5. As control was used the distilled water with the corresponding value of pH, that was corrected by means of divorcee solutions of muriatic acid and ammonia. Research results estimated in accordance with the generally accepted statistical methods. Results. It is the properties of this group of compounds, such as modification and destruction of proteins, chelating and high anti-radical effects, called P-vitamin activity. Therefore, the antioxidant properties of this class of compounds play a positive role in damaged cells, protecting them from structural and functional disorders by reducing the number of active forms of oxygen. With high reproductive capacity, flavonoids prevent oxidative damage to lipids of membranes, proteins and other functional cell molecules.

As a result of the research, the potential use of biologically active substances – P group vitamins as a marker to estimate the natural level of regulators of ontogenesis in the cell, which is an important indicator of the breadth of the standard response rate of the genotype of plants to the environment and provides relevant information for the creation of adaptive crops, has been experimentally confirmed.

Conclusions. It is this class of compounds may be used either together with or auxin and cytokinin instead.

The efficiency of using solutions with a concentration of 5·10<sup>-5</sup> mol/L of rutin for pre-treatment of seeds with minor injuries peel or endosperm, which can significantly improve the germination rate.

**Keywords:** bioflavonoids, rutin, triticale, wheat, oats, germination, morphological descriptions of sprouts.

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### **Efficiency of humin-based compounds in quail diet (p. 53–57)**

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Ontogenetic growth and development of quails may be accompanied by metabolic disorders, characterized by lowered hydrolytic ferment activity in gastro-intestinal tract, which causes worse feed nutrients digestion and results in insufficient supply of free amino acids and tissue protein synthesis depression. Among the promising ways to neutralize such disorders is the use of humin-based preparations and feed additives, which contribute to metabolism correction. One of such compounds is Humilid, a complex preparation developed at Prof. L.A. Khrystieva Humin Substances Basic Research Laboratory of Dnipropetrovsk State Agrarian University (Ukraine). We have researched the impact of Humilid on age dynamics of protein metabolism indices and hydrolytic enzyme activity in pancreatic tissue and duodenal mucosa of quails as well as their growth intensity and egg-laying capacity. It has been proven that the use of complex preparation boosted growth in quails and increased body mass at 72 days old by 6,5 % and egg-laying capacity by 5,1 % with simultaneous increase of proteolytic and amolytic activity of duodenal mucosa enzymes ( $p < 0,05 - 0,001$ ). At the same time, we have established a stimulating effect

of Humilid on biosynthetic processes in quail organisms, namely protein metabolism, which attests to increased content of soluble protein in duodenal mucosa during all stages of the test (28, 42 and 72 days old) in comparison to control group birds ( $p < 0,05 - 0,01$ ).

**Keywords:** quails, humin substances, hydrolytic enzymes, protein metabolism, egg-laying capacity.

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### **Environment assessment of technogenic soil pollution in industrial region of Annaba (Algeria) (p. 58–61)**

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Annaba has known an intense development, such as Industrial expansion (El Hadjar steel complex, fertilizers plant (FERTIAL), industrial zones of Meboudja and pont Bouchet), intense population growth, increased road traffic and high agricultural activities in recent decades. Therefore, due to this development the rise of various types of waste (industrial or household) released into the environment causing health and environmental problems. The city is bounded to the north and the west by the Edough massif (highest altitude: 850 m), the Mediterranean Sea to the east and the Seybouse alluvial plain to the south. The Edough massif is characterized by a Primary metamorphic rock platform of gneiss, schist, and micaschist. The alluvial plain is characterized by Tertiary gravelly and sandy-clayed layers at depth and arable Quaternary clay cover. The dominant wind comes from the north north-east, to a lesser extent, from the north and the west. The priority soils pollutants in Annaba are lead, manganese, zinc and nickel. The greatest environmental contamination of soils with heavy metals detected at a distance of 2 km from the metallurgical plant of El Hadjar. Due to make conclusion on the soil

pollution degree with heavy metals, the fourth zone was taken as a reference in calculation of the total pollution index. The degree of technogenic pollution in the 3–5 km zone near the steel plant of El Hadjar and in the centre of Annaba rated as “moderately threatening” according to control. The highest levels of biomass in radish plants marked for soil samples taken from the area adjacent to the airport. Meanwhile, the relative reduction in the value of biomass in radish sprouts in the remaining three zones was 10–25 %, whereas the protein content in the roots of radish plants were at the level of 0,6–0,8 times in comparison with the reference area of airport. The comparison of values of the isoelectric points of izoperoxidases revealed qualitative and quantitative differences in electrophoretic spectra of proteins in 4-day roots of the radish sprouts, grown on soils with different levels of technogenic pollution.

The high level of peroxidase activity was recorded in the leaves of plants grown in soil samples taken in vicinity of El Hadjar's metallurgical plant.

**Keywords:** environment, heavy metals, industrial region, pollution index.

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### **Zonal regularities of long-term climate changes on the Dnieper basin territory (p. 62–73)**

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A directed climate change is one of the most important global challenges of the 21st century, which goes beyond the framework of scientific research and represents a complex interdisciplinary problem covering ecological, economic and social aspects of sustainable development in the world. Over the past 20–30 years, the frequency and intensity of dangerous weather phenomena, which lead to significant economic damage, have threatened the stable existence of hydrogeoecosystems, as well as human health and life. The article presents a study of zonal (steppe, forest-steppe and mixed forest zone) patterns of long-term changes in climatic conditions over the past 200 years on the territory of the Dnieper transboundary basin using multivariate statistics and GIS technologies. For a comprehensive analysis, assessment of series heterogeneity, determination of temporal and spatial patterns of formation and synchronicity of the dynamics of climatic parameters (air temperature, amount of atmospheric precipitation), the study applies the following methods of multivariate statistics: descriptive statistics, regression analysis, transformation of variables (T4253H-smoothen, method of difference integral curves of modular coefficients) and cross-correlation analysis. The results received show a rapid increase in the average annual temperature of the air in three physical and geographical zones by 1,0–1,2 °C in the period from the late 80's to the present. The largest proportion of abnormal manifestations of temperature changes is observed in the steppes (34,9 %) and mixed forests (34,5 %), and the greatest probability of abnormal precipitation changes is observed in the forest-steppe zone (30,3 %). Long-term dynamics of intra-annual climatic changes reflect the occurrence of warming by 2 °C during the first 10 months, and an increase in average annual precipitation by 90 mm for the period from May to October. As a result of spatial and graphic analysis, we have recorded a decrease in the seasonal temperature regime variation from west to east and a rising sinusoidal depen-

dence of an increase in air temperature from the north-eastern (the river's source) to the southern part (the river's mouth) by 2,6 times. Precipitation is distributed rather unevenly, its spatial trend-cyclic increase occurring from the southern (409 mm) towards the northern (660 mm) parts of the transboundary basin. The application of multivariate statistical techniques allowed creating spatial functions of the distribution and provision of heat and moisture for the hydrogeoecosystem of the Dnieper transboundary basin (with a correlation of 0,59–0,99). The results and approaches to the multidimensional processing of meteorological data presented can be used for spatial and temporal research on long-term regularities of changes in the state of hydrogeoecosystems of river basins under the conditions of global climate change, as well as for the formation of programs of adaptive spatial and temporal basin nature use.

**Keywords:** climate, air temperature, precipitation, zonal patterns, Dnieper basin, multivariate statistics, modeling, GIS-technologies.

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### **Evaporation from the water surface of regulating basins of irrigation systems (p. 74–77)**

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The article presents materials on water losses determination for evaporation from the water surface of the regulatory pools of irrigation sys-

tems using the example of Tsarichanka interregional water management facilities.

Nowadays the vast majority of the basic funds of land reclamation systems are subjected to significant wear and tear, and they also require substantial investments to restore them and improve the efficiency. In this case, the primary task is to identify and eliminate unproductive water losses. The authors compared the income and expenditure parts of the water balance equation, as well as the percentage of unproductive water losses for evaporation and filtration. The months in which maximum evaporation values are observed are determined.

As a result of calculations it was established that during the irrigation season from three basins with total area of more than 20 thousand m<sup>2</sup> and a volume of water of about 80 thousand m<sup>3</sup>, evaporates about 1 thousand m<sup>3</sup>, which averages 3,5 % of the total losses. The rest of the losses pertain to filtration, which causes a low technical state of the objects under study.

The establishment of an inefficient part of water losses from the regulatory pools of irrigation systems is an urgent task, which allows taking measures to improve their technical condition and conduct an environmental and economic justification for the efficiency of water resources use.

**Keywords:** regulating basin, irrigation system, evaporation from the water surface, atmospheric precipitation, air temperature, water loss.

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### **Determination of moisture, density, hardness of soil in field conditions (p. 78–82)**

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In the article the results of experimental studies accumulation of moisture in the soil. **Problem statement** studying the surface treatment of soil, shows that the loosening of the soil surface for easy access of air and water into the soil. The structure of the surface layer decreases as the evaporation of moisture from the surface and from the lower layers of the soil. Therefore, below loosened soil moisture accumulates and accordingly changes the physical properties of the soil. **Therefore, the purpose** of this study was to study the temperature on the surface and in the depth of soil, obtained in the field, and to construct a diagram of the dependence of relative humidity on the soil surface, moisture content, density, soil hardness from the temperature ratio.

**Discussion** the results of studies on the effect of surface treatment on its soil density. The dependence of the thermal insulation layer on the crop and the method of loosening the soil surface while kneading plant residues, which provides a low thermal conductivity layer. Made processing of experimental parameters on the surface temperature and the depth of soil. Built chart depending on the relative humidity at the surface, density, hardness of attitude soil temperatures at the surface and a depth of soil, which makes it possible to determine the pattern formation of soil moisture, water and predict the thermal properties of the soil. The resulting information to evaluate previously held ahrozahody (traditional, minimal, NO-TILL IT) efficiency accumulation or loss of moisture from the soil. The use of evaluations thermal condition of the soil can quickly make the best decisions for cultivation, control the formation of a crop of agricultural crops. **Therefore**, we can conclude that the obtained data allow us to construct an experimental dependence diagram. Consequently, humidity, density, hardness of soil are determined on the basis of indices of dimensionless temperature and relative humidity on the soil surface

**Keywords:** relative humidity, density, temperature gradient, soil, diagram humidity, tillage.

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### **Operating properties of composite materials “silica gel–sodium sulphate” and “silica gel–sodium acetate” for solar adsorptive heat pumps (p. 83–86)**

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Operation peculiarities composite sorbents “silica gel – sodium sulphate” and “silica gel – sodium acetate” synthesized by sol-gel method for solar adsorptive heat pumps are studied. Distinction in kind of kinetic curves of water sorption with composite sorbents “silica gel – sodi-

## ABSTRACTS. REFERENCES. KEYWORDS

um sulphate" and "silica gel – sodium acetate" and massive salts is shown, it being confirmed by nearly linear initial section of water sorption kinetic curve of composite sorbents adsorption vs. time square of time and S-shaped kinetic curves for hydration of massive salts. Observed S-shaped kinetic curves for massive salts are typical for hydration in kinetic regime. Composite sorbents hydration is stated to be diffusion-determined in the range of temperatures of 20–60 °C, i.e. rate-determinant stage is water transfer on pore system of sorbents. Activation energy of diffusion process is stated to be 52 kJ/mole for composite "silica gel – sodium sulphate" and 64 kJ/mole for composite "silica gel – sodium acetate". Construction of solar adsorptive heat pump is developed. Suggested heat pump coefficients of energy performance are stated to be 2,084 when composite "silica gel – sodium sulphate" used and 2,021 when "silica gel – sodium acetate" used. Seasonal dependence of net coefficient energy performance for suggested adsorptive heat pump based on composites "silica gel – sodium sulphate" and "silica gel – sodium acetate" is revealed. Correlation of coefficients of energy performance of adsorptive heat pump and composite sorbents properties (sorption capacity and regeneration temperature) is stated. Insignificant decreasing of coefficients of energy performance when "silica gel – sodium acetate" used is explained by lower sorptive capacity as compared to "silica gel – sodium sulphate". Suggested heat pump application perspectives are shown for heat supply systems to result from traditional energy sources independence and environmental advantages.

**Keywords:** composite sorbents, sorption capacity, regeneration temperature, solar adsorptive heat pump, energy effectiveness.

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### **The Estimation Statistics of Farm Lands Plough Disturbance and Fiber Flax Yielding capacity (p. 87–92)**

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According to the generalized scientific knowledge and taking into consideration some regional peculiarities of crops growing, the plough disturbance of farm lands in Ukraine should be limited in the range of 33–57,9 %. The plough disturbance of the farm lands belonging to 52 large-sized agrarian enterprises of Zhytomyr Polissia at which the concentration of sowing area under fiber flax during the period of intensive flax growing in Ukraine fluctuated in the range of 4,2–13,6 % have been elucidated in the paper. The spreading of plough disturbance is characterized by corresponding rates of mowing and slopiness. It had negative asymmetry and excess with the indexes minus 0,37 and minus 0,56 respectively. According to the numerous data values of the given indexes the spreading can be considered as slightly asymmetric and slightly excessive. The ratios of the asymmetry and excess indexes to their errors are 1,09 and 0,82 respectively, that is considerably less than three. Thus, asymmetry and excess of plough disturbance spreading are insignificant and there are no grounds for considering the problem of empiric deviation spreading from the normal one. The arithmetic average and the quadratic average deviation of the empiric spreading of plough disturbance at the enterprises which were under control equaled 65,5 and 9,75 %

## ABSTRACTS. REFERENCES. KEYWORDS

respectively. Using the characteristics of normal spreading as well as the tabulated values of Laplas function it has been determined that the probability of farm lands spreading, which is within 33–57,9 % at these enterprises, amounts to 0,21 %. An additional correlation relation between fiber flax seeds and fiber yielding capacities on the one hand and the farm lands spreading on the other hand with the correlation coefficients of 0,109 and 0,245 respectively has been revealed. Numerous values of the correlation ratio of the resultative characteristics on the factorial one somewhat exceed the correlation coefficients values and judging from their seed and fiber yielding capacities they equal to 0,204 and 0,270 that testifies to the probable curvilinear relations between the resultative and the factorial characteristics.

The equalizing of the experimental values of seed and fiber yielding capacities by some approximal functions showed that by the value of R<sup>2</sup>-coefficient it is more successful to make the equalizing using the equation of the reciprocal relation.

**Keywords:** agricultural land, ploughing up, fiber flax, yielding, seed, fiber, correlation, regression equation.

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### Modeling of technological processes of soil-tilling machines (p. 93–97)

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**Formulation of the problem.** Modeling, as an instrument for development of the constructive parameters of technologically complex ma-

## ABSTRACTS. REFERENCES. KEYWORDS

chines, is widely used in various branches of science and technics. It is quite difficult to systematize the types of modeling, because each industry has its own specific features and model research are performed taking them into account. Historically, two types of modeling have been developed in farm machine building, which can be clearly defined as independent, physical and mathematical.

**Purpose of work.** To substantiate rational schemes of model research of the tools of soil-tilling machines.

**Results of the study.** The minimum required number of parameters which should be accepted at determination of a similarity parameters for the tool was calculated. It is noted that scaling often changes the physics of the processes being studied, especially when it is a question of active tool. Therefore, in the work the expediency of the transition to group similarity criteria, which allow to take into account the mutual effect of the parameters on each other, is argued. The prospectivity of the use of hydrodynamic modeling based on the comparison of the components of V.P. Goryachkin equation for draught resistance of soil-tilling machines and I. Bernoulli equation for the total hydraulic head in a liquid medium are substantiated.

**Conclusions.** It is noted that this type of modeling can be considered as a variety of simulation, but it can not be accepted as the main one for research, because it gives only an analogous picture of the process without the possibility of obtaining its numerical characteristics. However, the method is irreplaceable in the case when it is necessary to trace in time the propagation in the medium of the force field from a moving tool, which can not be obtained by physical and mathematical modeling methods. Therefore, the most rational can be the combination of all three methods: mathematical, physical and hydrodynamic.

**Keywords:** hydrodynamic modeling of technological processes, similarity criteria,  $\pi$ -theorem, scale factor.

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### Computational aspects of non-linear models of optimization in agrarian sector of economy p. 98–102

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The researches on applying mathematical methods and information technologies to solving actual problems of Ukrainian agriculture have been continued in the paper. Mathematical apparatus enables us to expand calculating opportunities of free software that is important for implementing information technologies in the domestic agrarian sector under conditions of restricted financial resources.

The enhanced market competition and crisis factors have caused the urgent necessity of optimizing the agrarians' activity. In particular, nowadays the maximization of profitability in grain crops production is very important practical issue. As far as Ukrainian grain crops not only saturate the domestic market, but also support food security in the global scale. The distribution



## ABSTRACTS. REFERENCES. KEYWORDS

of sown areas under wheat, maize for grain and barley with the maximum total profitability has been described by the non-linear interval optimization model. Its mathematical transformation allowed us to conduct calculations by means of the instruments of free Spreadsheet LibreOffice Calc and obtain results that coincide with the check answers of Microsoft Excel. It has been set up that under the pessimistic scenario the recommended sown areas under wheat, maize for grain and barley with the structural shares of 50, 20 and 10 % would provide 40 % of profitability. It has been grounded that under the optimistic scenario with profitability up to 106 % it would be expedient to distribute 30, 40 and 10 % of arable lands under wheat, maize for grain and barley. Both variants have supposed 20 % of fallow lands.

In the further researches it has been planned to extend the obtained results to the animal production in Ukraine.

**Keywords:** agrarian sector, non-linear model of optimization, free software, grain crops, profitability.

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### **Econometric modeling in the agrarian market of vegetable production (p. 103–108)**

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The article considers the questions of creation of econometric models of dependences of volumes of crop products production and consumption

## ABSTRACTS. REFERENCES. KEYWORDS

in the Dnepropetrovsk region based on factors that most significantly affect them. The matrix of paired correlation coefficients between average prices for the sale of vegetable crops by agricultural enterprises, planting areas for vegetables, agricultural output, the volume of production, average wages in the Dnipropetrovsk region, the volume of consumption and production of vegetables per person per year was calculated. Linear and nonlinear regression dependences of the volume of vegetable production on their agricultural output were created; linear and nonlinear, paired and multiple dependencies of the vegetables average selling prices on agricultural output, production volumes and wages; volumes of vegetables consumption dependencies on selling prices, agricultural output and vegetables production. The assessment of the models created was made on utmost increase of the dependent variable, elasticity coefficients and relative indexes of forecast quality. The influence impact of each of the factors on the output function was analyzed. It was determined that the average vegetables selling prices are mostly influenced by wages, then by their production volumes and agricultural output. Vegetables selling prices can be defined as elastic in agricultural output and production and inelastic in terms of wages. The vegetables consumption volume primarily depends on their production, then on agricultural output and average selling prices. The vegetables consumption volume can be considered as inelastic for all the factors considered.

**Keywords:** food security, modeling, regression analysis, statistical significance, production, consumption, vegetable production.

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### **Business reputation of the enterprise as an accounting object (p. 109–112)**

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It is determined that business reputation is a fundamentally new object of accounting, which is characterized as: intangible, special, unique nature of the given object; there is a causal relationship between the presence of the business reputation and its competitive advantages; interrelation of the availability of business reputation of the enterprise with the possibility of obtaining additional economic benefits. A number of measures have been formulated to create accounting information on the acquired business reputation and to reflect it in the financial statements, which requires the clarification of the composition of facts of economic life associated with the recognition and change in the cost of goodwill in accounting and reporting, as well as adjusting the composition and correspondence of accounts, used to display data facts. The proposed correspondence of accounts to reflect the change in the value of goodwill, which provides for the attribution of the value equivalent of the acquired business reputation, which is estimated as the difference between the market value of the enterprise and its own capital, to a separate sub account of account 12 "Intangible assets" and accounts 42 "Additional capital", which allows you to more reliably identify sources of business reputation formation in the balance sheet passive and deploy information about goodwill.

**Keywords:** accounting, goodwill, business reputation, intangible asset.

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### **Formation sales marketing strategy of bakery products (p. 113–116)**

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During the formation of a marketing strategy in the market of bakery products, particularly products from grains, which are joined by environmentally oriented technologies must be considered in addition to the quality of the products, which is appreciated by end users, there are other factors. These include aromafaktor, convenience packaging and optimal weight of one commodity unit, field sales and hassle buying process. Consider the attention of the two most influential factors. This is the price and weight of a commodity units that are interconnected.

High dependence from natural conditions of ecological agricultural production which is technological cycle of cultivation grain crops, leads to increased risk and cost price performance.

The classic marketing tool provides both market research in order to develop product positioning strategy (so-called passive methods of measurement), and thus creating demand by the way of the base of informational influence on potential customers.

The article substantiates the features of creating a marketing strategy for bakery products. This allows us to accurately and reliably forecast the development of the marketing activities of the agricultural enterprise. It is proposed to take into account, besides the composition of the product, other factors. This ensures the actualization of information content for the ultimate potential consumer. That, in turn, raises the effectiveness of marketing activities by forming a preliminary demand. There is a shift in the emphasis of the

informational influence on the time component. This component is synchronized on time with the action of information interaction with potential consumers.

**Keywords:** agricultural marketing, sales strategy, bakery products.

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### **Using of information technologies in agrarian marketing (p. 117–122)**

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The agrarian sector of Ukraine not only provides the population with food, but also is an export-oriented industry that provides more than 40% of foreign exchange earnings. Therefore, in the conditions of the formation of the information and innovation economy, global hyper competition in agricultural markets, the growth of knowledge and the requirements of consumers to the assortment and quality of products, domestic manufacturers need to respond flexibly to changing market conditions. This is possible with timely in-

## ABSTRACTS. REFERENCES. KEYWORDS

formation, access to global knowledge and data bases, use of information technology and innovation in marketing management with the use of search marketing services, electronic mailings, online offices and services for holding tenders. The purpose of the article is the definition of the main aspects of information technologies using in agricultural marketing. During the research methods of comparison and analysis, analogies and generalizations were applied.

Analyzes the basic information technologies and software used in the collection and analysis of marketing information, drawing up plans and forecasts, organizing promotion and marketing. It is proposed to include free software, web services and mobile applications in agricultural marketing information systems.

A promising trend in the development of information technologies is the comprehensive use of portable devices and their applications based on 3G technologies.

**Keywords:** information, information technology, software, internet services, agrarian marketing.

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### **Financial and credit relations of ensuring investment and innovative development of the agrosphere (p. 123–128)**

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The theoretical and methodological aspects of the modern scientific paradigm of the process of expanded public reproduction and its motive factor, the investment and innovation process, are considered. The specification of the economic essence of the category "Investment" as an attribute of augmentation of the total volume of the enterprise's capital, both basic and negotiable, was made. The mechanism of dialectical unity in this process of determinancy of the increase in quantitative and qualitative parameters of economic development as sources of progress is considered. The trends in the development of



## ABSTRACTS. REFERENCES. KEYWORDS

the reproduction process at the national level, as well as in agricultural production and in the food industry are determined. It has been established that the level of investment in public reproduction in the Ukraine is insufficient: annual investments increased until 2012 inclusive, reaching 20,1 % of GDP (gross domestic product), and then sharply decreased to 13,8 %, while necessary it is considered level of 20–25 %.

At the same time, the volume of investment of agriculture and food industry in the total amount of capital investments has an insignificant but steady tendency to increase. This is due to state support for agricultural commodity producers by compensating part of the interest rate for the loan and some administrative measures. State support for the stability of the country's agrosphere system is caused by the need to maintain the stability of this sector, vital from the point of reliable food supply to the population and increasing the volume of products for export.

In general, the need to further improve the mechanism of financial and credit relations in supporting business activities of agricultural enterprises is determined. This is expected due to systemic reforms and in particular – the land market and land mortgage.

**Keywords:** expanded social reproduction, Investment and innovation process, financial and credit relations, endogenous financial resources, loans.

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### **Internal economic mechanism of formation and reproduction fixed assets the enterprise (p. 129–133)**

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The theoretical and methodological aspects of implementing a set of measures for creating an internal economic mechanism for the formation and reproduction of fixed assets of the enterprise are examined. The economic essence and value of accrual of depreciation from the point of view of formation of internal financial possibilities with a view of reproduction of the basic means by creation of a depreciation fund of the enterprise as the original indicative parameter of process of an embodiment in a monetary resource is specified. To this end, it is necessary to use

## ABSTRACTS. REFERENCES. KEYWORDS

depreciation savings by the criterion of maximizing the present value of cash flows, which, through capital investments, will be embodied in the growth of production. It is established that the sufficiency of funding sources for the reproductive process of the basic working capital is of decisive importance for the financial state of the enterprise, which is always in the field of view of its managerial component. For this purpose, it is very important to determine a reliable estimate of the value of fixed assets, which will ensure the possibility of conducting an economic analysis of the effectiveness of their use in the system of the economic mechanism of enterprise management. The economic expediency of the depreciation fund is substantiated, which should be considered behind the options for reserving funds in the amortization fund with its placement in deposit bank accounts at a certain percentage, and using depreciation charges in the economic turnover of the enterprise in order to increase its own working capital, resulting in a profit increase. In general, the direction to increase the production of goods necessary for society, increase the return of the created productive potential, improve the balance of fixed capital, reduce the cost of production, increase profitability of production and savings of the enterprise. Such results will result in a more complete use of the fixed assets of the enterprise, which will lead to a reduction in the requirements for the introduction of new production capacities with a change in the volume of production and, consequently, to a better use of profit in terms of increasing the share

of deductions to the consumption fund, with the greater part being channeled to mechanization and automation technological processes.

**Keywords:** fixed assets, reproduction, amortization fund, profit, cash flows, capital investments, working capital, output growth.

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