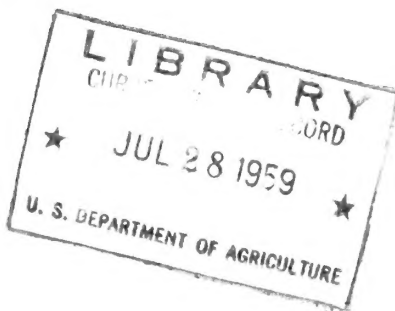


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FEDERAL-GRANT RESEARCH

at the

STATE AGRICULTURAL

EXPERIMENT STATIONS

Projects on

PLANT PHYSIOLOGY AND NUTRITION

Part 18

Agricultural Research Service
UNITED STATES DEPARTMENT OF AGRICULTURE

Compiled May 1958 by

The State Experiment Stations Division, Agricultural Research Service, U. S. Department of Agriculture, Washington 25, D. C., for use of workers in agricultural research in the subject-matter areas presented. For information on specific research projects write to the Director of the Station where the research is being conducted.

Issued June 1958

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INTRODUCTION

This compilation is one of a series providing information on State agricultural experiment station research supported by Federal-grant funds appropriated annually by Congress under authorization of the Hatch Act of 1887, as amended and approved Aug. 11, 1955, and Section 204(b) of the Agricultural Marketing Act of 1946. It is prepared for use by research workers in the subject-matter areas presented. Only that part of each State's research program supported by Federal-grant moneys is included.

In addition to the Federal-grant moneys, the State experiment stations receive some Federal support through cooperative agreements or contracts with the U. S. Department of Agriculture. Information on such research, along with other departmental research, is available in the Central Project Office, Agricultural Research Service.

A substantial part of each State agricultural experiment station's research is supported with moneys appropriated by the respective State or Territorial Legislatures and through other forms of private and public financing. Information on current agricultural research at the stations which is not financed under the Federal-grant program or through USDA cooperation can be obtained from experiment station directors.

The information given in the series of Federal-grant compilations includes the title and objectives of each Federal-grant project pertaining to the subject given on the cover. The identification of each project gives the department(s) conducting the research, the station number of the project, and the number of the regional project if it is a contributing project.

Relevant regional projects, if any, appear at the end of the compilation. States having projects contributing to regional projects are indicated. The Roman numeral (and capital letter) refer to the location in the summary of the contributing project title and objectives. The States are grouped into four major regions. These are designated NC-North Central, NE-Northeastern, S-Southern, and W-Western. The capital letter "M" following the letters for the region indicates regional marketing projects.



PLANT PHYSIOLOGY AND NUTRITION

General

- Ala. Relationship of the Microflora to Deterioration of Stored Seed. To learn (1) effects of seed moisture content, storage temperature and aeration on growth of various species comprising microflora of stored seed, (2) relationship between activity of microflora and deteriorative changes in stored seed, and (3) effect of microfloral inhibitors on microbial growth and bioprocesses of seed.
Bot., Pl. Path. 571
- Ariz. Pollen Substitute for Honeybees. To produce an economical substitute for pollen fraction of diet of honeybees.
Biochem. 382
- Ark. A Study of Factors Affecting the Fruiting Behavior of Cotton. To investigate factors affecting fruiting habits of cotton: initiation, intensity, fruiting pattern, cutout, etc., (2) use obtained information to tailor growth of plant that maximum yields may be secured from available soil and climatic resources.
Agron. 406 Coop. ARS
- Ill. A Study of Various Factors Affecting the Thermal Resistance of Bacterial Endospores. To evaluate and determine conditions which affect the thermal resistance of bacterial endospores with particular emphasis on endospores produced by bacteria of importance in spoilage of thermally produced foods.
Food Tech. 50-376
- Ind. The Effect of Fungus Products on Plants. (1) Search among products of micro-organisms for compounds affecting dormancy, growth and disease development in plants. (2) Learn mode of action and properties of compounds possessing such characteristics. (3) Develop techniques for application of useful compounds discovered.
Bot., Pl. Path. 804
- Kans. Physiological Studies on Crop Plants. To (1) determine role of wheat awn, particularly its relation to yield, test weight, and kernel weight; (2) study physiological factors influencing development of chlorosis in sorghums; and (3) develop or adapt chemical tests for tissue viability in wheat plants subjected to temperature extremes; also comparable test for protoplasmic differences which may exist between drought resistant and susceptible lines of wheat.
Bot. and Chem. 189 Coop. USDA

Maine

Physiological Investigations of the Potato Plant.

(1) Study effects of growth substances; macro and micro nutrients, and other chemicals on tuberization, differential nutrition, and other undefined interactions. (2) Characterize various cation-anion relations as to effects on mode of entrance, use, metabolic aspects, and interactions thereof. (3) Evaluate effects of restricted O on P and K mitigation and tuberization-initiation and differentiation. (4) Study soils in regard to exchange complexes and their association with nutritional aspects. (5) Increase crop production by application of fundamental results from above investigations.

Agron. 47 Coop. NSF

Nebr.

Physiologic Studies of Obligate Parasitism, with Special Emphasis on Diseases Caused by Rust. (1) Develop quantitative techniques for: inoculation of obligate parasites, maintenance of host and parasite under controlled conditions, determination of extent of development of parasite. (2) Study specific metabolic system responsible for obligate nature of parasitism. (3) Determine metabolic changes in host during, and as result of, infection, particularly changes which may be associated with resistance or susceptibility of host. (4) From 2 and 3, effect an inquiry of possibility of effective chemotherapeutic control of obligate parasites of economic importance. (5) Establish quantitative, rapid and reliable methods for evaluating chemical compounds as possible chemotherapeutants.

Pl. Path., Pl. Physiol., Field Crops 502

S. C.

Physiological Relationships of Clovers. (1) Study physiology of clovers, involving effects of temperature, moisture, light, and nutrition on establishment, growth, defoliation, seed production and survival of clovers including absorption, translocation, respiration, photosynthesis, chemosynthesis, plant composition, etc. (2) Learn physical interactions as related to incidence and destruction of different diseases. (3) Develop screen methods and techniques to obtain resistance to unfavorable environmental factors and for freedom from undesirable plant constituents giving objective to breeding, culture, management, and seed production research.

Bot. and Bact. 328 Coop. ARS

Texas

Spraying Equipment for the Control of Cotton Insects and for Defoliation. To (1) improve spraying equipment in efforts to obtain better distribution of chemicals for control of pink bollworm; (2) determine nozzle type, arrangement and spacing to give optimum spray patterns for insect control including pink bollworm and for defoliation of cotton plants; and (3) check insect infestations to determine effectiveness of insecticidal applications with various types and arrangements of nozzles on booms and effects of chemical removal of foliage of cotton on full populations of insects, especially overwintering of pink bollworms in unharvested material.

Agr. Engin., Ent. 722

Texas

Physiology of Rust Resistance in Wheat and Oats. (1)

Make systematic study of organic compounds in wheat and oat plants that may affect response of such plants to rust pathogens. Study (2) effects of fungicides, growth hormones and related compounds that may modify host response to rust organism; (3) physiology of pathogen to establish better methods of distinguishing races or biotypes of organisms; (4) interaction of environmental factors as light and temperature on rust reactions and attempt to discover what compounds are being produced or changed as a result of changes in environmental factors.

Agron., Pl. Physiol., Pl. Path. 1114 Coop. ARS

Utah

Fluorosis in Plants and Animals. To learn (1) extent and distribution of fluorosis in plants and animals in selected areas of Utah; (2) if increased levels of grain, Ca, and P, and aluminum salts will help to alleviate symptoms of fluorosis in dairy cattle; (3) if dairy cattle can be raised in areas where fluorides are in atmosphere; (4) by survey on animals if fluorosis in animals is increasing or decreasing; (5) toxic level of fluorides for young dairy cattle; (6) by autopsies and histopathological studies on animals with varying degrees of fluorosis; (7) By survey if fluoride residue is decreasing on plants in Utah County.

Anim. Husb., Chem., Dairy Husb. 364 (W-39)

Utah

Insect Activity in Relation to Fluoride Content of Plants.

(1) Survey areas of fluoride injury to plants for purpose of: learning role of insects in injury of plants, studying insect populations and species on plants injured by fluorine. (2) By greenhouse experiments learn if fluoride level of plant has any direct effect on activity of insects associated with plant under study.

Zool. 462

Ecology

Fla.

Evaluation of Introduced Plant Species and Varieties.

Screen foreign and domestic plant introductions for adaptations and use as forage and cover crops in state, and provide data on performance of newly developed field crop species and varieties.

Agron. 767 (S-9) Coop. ARS

N. C.

A Study of the Marsh and Aquatic Vascular Plants of the Coastal Plain of North Carolina. (1) Learn present distribution of marsh and aquatic vascular plant species within the Coastal Plain region of state. (2) Observe environment where species exist.

Bot. 38

- N. C. Ecological Relationships of Permanent Pasture Plants. To (1) determine relative values and adaptations of promising grasses and legumes when grown in associations; (2) determine associative effects of various mixtures on the botanical and chemical composition of the individual species; (3) determine effects of various management systems on the survival, productivity and chemical composition of certain adapted pasture legumes and grasses; (4) study root interrelationships of certain adapted pasture legumes and grasses; (5) study moisture requirements of certain adapted pasture legumes and grasses; and (6) determine best method of establishment of permanent pasture mixtures including proper seeding rates, methods and inoculation procedures.
Agron. 64
- Absorption and Translocation
- Calif. The Physiological Nature of the Processes of Salt Absorption by Roots: Relations Between Salt Absorption, Accumulation and Translocation, and the Metabolism of the Plant, Effects of Concentration and Interrelations of Salts in Nutrient Solution; Effects of Oxygen Supply to Roots and of Temperature of Culture Medium. To study the factors affecting root metabolism in relation to solute absorption, and translocation, as a basis for an understanding of crop adaptations to soil and climate, and of the use of soil amendments.
Pl. Nutr. 490
- Ill. The Physiology and Biochemistry of Ion Absorption by Roots. Learn nature of active transport of ions across cell membranes.
Agron. 15-376
- Minn. Movement of Natural Compounds and Agricultural Chemicals in Plants: Its Direction, Modification and Mechanisms. Study (1) rate and direction of movement of plant metabolites from leaves to other plant organs and study effect of stage of plant development and of certain environmental factors as light and temperature on this movement, (2) movement in plants of chemicals used in agriculture as herbicides and systemic fungicides in relation to normal flow of metabolites, to environmental conditions and to ontogeny of plant.
Agron. and Pl. Genet. 2227
- N. J. Nutrient Ion Absorption--The Study of Ion Absorption and Accumulation in Relation to Plant Growth and Quality. To study (1) external and internal factors affecting absorption and utilization of Fe by plants; (2) activity of Fe-containing enzymes in plants in relation to utilization and availability of Fe.
Pl. Physiol. 501

- Pa. The Absorption and Translocation of Chemicals by Healthy and Oak Wilt-Disease Trees. (1) Compare ability of oak wilt-infected and non-infected trees to absorb chemicals applied to stumps and intact trunks, and to elucidate the factors involved in absorption of these substances. (2) Compare ability of infected and non-infected trees to move and trans-locate foreign chemicals within stumps, roots and stems, following application of these substances.
Bot. and Pl. Path. 1147-D (NE-25)

Transpiration and Water Relations

- Ark. Supplemental Irrigation Investigations with Horticultural Crops. To (1) study influence of varied water sources on soil condition and crop response with particular reference to sources with high salt content, and determine if such waters can safely be used under any conditions of horticultural production; (2) measure value of supplemental irrigation in terms of yield and quality of horticultural crops now generally produced in Arkansas; (3) determine if supplemental irrigation can be used in developing production of new horticultural crops in Arkansas; and (4) study possible changes that may be needed in management program of irrigated crops, such as planting dates, varieties, and disease and insect control.
Hort., For. 310

- Ark. Studies of Physiological Factors that Influence Water Needs and Use in Production of Horticultural Crops. To (1) study methods of determining soil moisture in an attempt to find or develop a reliable and efficient technique for use in studies and for grower use; (2) determine range of available soil moisture permitting optimum growth and fruiting of plants, and if this range varies for different stages of plant development; (3) determine relation between nutrient use and moisture ranges for horticultural crops; and (4) study relation between temperature, optimum soil moisture range and frequency of water application.
Hort., For. 388

- Ark. Studies of Physiological Factors Affecting the Growth of Agronomic Crops Grown Under Irrigation. To (1) determine critical time intervals of moisture stress which may affect yield and quality of certain selected agronomic crops (2) learn water needs of agronomic crops under varied levels of soil fertility, moisture conditions and stages of plant growth. (3) learn effect of supplemental irrigation on date and length of fruiting periods, maturity date, yield, and composition of agronomic crops, (4) study effect of soil and air temperatures, and relative humidity as modified by supplemental irrigation on physiological responses of the agronomic crops, and (5) learn possible effects of deposits of Fe and Mn from sprinkler applied irrigation water upon the physiology of some agronomic crops.
Agron. 392

- Calif. Relation of Soil Moisture Conditions to the Physiology of Plants. To (1) develop means of relating measurable soil moisture stress conditions within root zone to effective moisture stress in the plant; (2) study effects of moisture stress on root functioning and rate of elongation; (3) determine relative effects of increasing moisture stress on various aspects of plant functioning and growth; and (4) investigate influence of environmental conditions on relations between soil moisture stress and plant growth.
Irrig. 1582 (W-29)
- Colo. The Influence of Irrigation Practices on Soil Structure and Plant Growth. To learn effect of methods of (1) application of irrigation water on moisture distribution, surface crusting, and plant emergence and growth; (2) land preparation for irrigation and effect of subsequent tillage operations on soil tilth.
Agron., Agr. Engin., Soils 17
- Idaho The Water Requirements of Tree Fruits. To (1) develop a practical technique for determining the point of critical water deficit in fruit tree tissues; and (2) measure effects of acute water deficits on growth of trees and fruit.
Hort. 209
- Iowa Favorable Substrate Moisture Levels for Germination Testing of Grass Seeds. (1) Devise methods of maintaining measured moisture levels in germination substrata. (2) Learn moisture level requirements of germinating grass seeds with respect to application in conducting reproducible germination tests.
Bot., Pl. Path. 1360 (NCM-23)
- Maine Efficient Utilization of Irrigation Water. Learn total water needs as well as critical moisture period during growing period of crops. Make soil moisture analysis on soils of different texture which can be used in designing and utilizing irrigation installations.
Agron., Agr. Engin. 59 (NE-22)
- Mont. Effect of Moisture Stress During Germination on Genetic Shift in Perennial Forage Genotypes. (1) Evaluate moisture stress effects on genotypic changes in a forage species. (2) Compare methods of learning germination responses under moisture stress.
Agron., Soils 930 (W-58)
- Nebr. The Relationship Between Meteorological Factors and the Rate of Water Use by Corn. (1) Relate evapotranspiration, meteorological phenomena, and physical characteristics of the soil to crop response. (2) Develop a water use equation for calculating irrigation needs of corn.
Agr. Engin. 570 (NC-46)

Ohio Factors Affecting Growth and Mineral Absorption by Plants.
3. Mineral Absorption by Plants in Relation to the Soil Moisture Supply. Study nutrient accumulation in plants in relation to soil moisture content and soil moisture tension in the range of wilting point to saturation.

Agron. 1-3

Ohio Factors Affecting Growth and Mineral Absorption by Plants.
4. Factors Affecting the Absorption by Soybeans of Native Soil Manganese and Applied Manganese. (1) Study effect of rate and placement of N, P, and K fertilizers applied individually and in combination on the availability to soybeans of native soil Mn, and Mn incorporated with fertilizers. (2) Learn residual effect of applied Mn in light and heavy textured soils. Investigate (3) relation between variation in soil temperature and soil moisture and apparent fluctuation in rate of absorption of Mn by soybeans; (4) susceptibility of various varieties to Mn deficiency.

Agron. 1-4

Photosynthesis

Ariz. Investigations on the Stomatal Mechanism. (1) Learn importance of photosynthesis in stomatal behavior. (2) Learn importance of CO₂ concentrations and H₂O and mineral deficits in stomatal behavior. (3) Study stomatal periodicity of native and cultivated plants. (4) Correlate laboratory studies on importance of photosynthesis, CO₂, H₂O, and minerals with seasonal behavior of stomates in native and cultivated plants.

Bot. 385

N. J. Photoperiodic Response of Woody, Ornamental Plants. (1) Stimulate or force additional growth on container-grown nursery stock. Learn (2) proper timing for light application on individual species, giving maximum vegetative growth and adequate hardening off so winter injury will be at a minimum; (3) period when supplemental lights are effecting the additional growth to occur; (4) photoperiodic response of a wide variety of plants to supplemental lighting during growing season.

Hort. 364

N.Y. (Cornell) Photobiology in Plants. Study some of the photo-responses of plants more completely, and use light as an analytical tool in studying physiological processes in living plants.

Bot. 218

P. R. Photosynthetic Efficiency of Tropical Plants Under Various Environmental Conditions. To obtain specific information on amount of nutrients assimilated and feed manufactured by plants under varying climatic conditions.

Pl. Physiol. 81

Mineral Nutrition

- Ariz. Basic Principles Involved in Trace Element Nutrition of Crops and Availability in Calcareous Soils. To (1) develop procedures for estimating availability to crops of micronutrients in calcareous soils, (2) investigate factors affecting availability of certain micronutrients in calcareous soils, (3) determine effect of different degrees of micronutrient deficiencies on crop yield and quality, (4) evaluate availability of different single micronutrient fertilizers to plants, (5) study inter-relationships between rate of applications of major elements to soils and micronutrient deficiencies, (6) investigate fundamental behavior of soil and foliar applications of chelated micronutrients.
Hort., Agron. and Range Mgt.
- Ark. Studies of Physiological Factors that Influence the Nutritional Balance and Development of the Rice Plant. (1) To learn nutrient deficiency symptoms and correlate tissue analysis with these deficiency symptoms, (2) learn possible relationship between mineral balance and straighthead of rice, (3) study effect of soil alkalinity on nutritional balance of plant, (4) learn effect of cultural practices as spacing, variety and water management on rice development.
Agron., Pl. Path. 397 Coop. ARS
- Calif. Fixation and Availability of Cations and Anions in Soils. - Chemical and Nutritional Aspect. Investigate: (1) suspected cases of Se poisoning of cattle reported by farm advisors in affected areas; (2) relationship between Se and Fe nutrition of Stanleya. (3) Study methods for Se detection by X-ray spectrography and wet analysis.
Soils, Pl. Nutr. 1023
- Calif. Functional Aspects of Inorganic Elements in Plant Nutrition with Special Reference to Micronutrients. To gain a better understanding of the physiological role of known essential inorganic elements, especially as it may relate to C assimilation; continue search for new essential elements by investigating nutrition of lower plant forms (algae), and of plants growing in special environments (as in sea water).
Soils, Pl. Nutr. 1024
- Calif. Factors Affecting the Absorption of Minor Elements by the Leaves of Vegetable Plants. To (1) overcome some minor element deficiencies which cause a loss in crop production and a lowering of nutritional value of vegetables produced; and (2) find how to overcome the acidity or alkalinity of spray material and form of minor nutrient used in cases where these affect whether or not the nutrient can pass through the cuticle and through cells of the leaf into the conducting tissues.
Veg. Crops 1591

Storrs
(Conn.)

Plant Tissue Analysis as a Measure of Nutritional Status of Fruit Trees. To (1) note seasonal trend in soluble nutrient content of apple leaves, (2) note effect of tree position of leaves on seasonal trend, (3) amass data by state-wide leaf analysis survey to indicate general nutritional levels of apple orchards, (4) note if nutritional level of apple trees varies by tree age and variety; and (5) investigate relation of soil fertility to tissue composition.

Pl. Sci. 183

Fla.

Nutrition and Physiology of the Peanut. To determine the growth requirements and study the physiology of peanuts as a basis for increasing yield and quality.

Agron. 488

Fla.

Effect of Various Levels of Fertilizers on Sweet Potato Production. Study effects of rates of fertilizers on yield and quality of sweet potatoes.

Veg. Crops 681

Ga.

Lime, Minor Elements--Effect of Lime on Availability of Molybdenum and the Resulting Influence on Yield and Mineral Nutrition of the Peanut and on Certain Other Minor Element Relationships. (1) Learn influence of lime on availability of Mo in representative soils of peanut belt. (2) Study effect of lime on Mo uptake by peanuts. (3) Measure combined influence of lime and Mo on mineral content of peanuts. (4) Establish level at which Mo becomes a limiting factor in production. (5) Where minor element deficiencies occur, study their relation to lime levels and other factors.

Agron. 44

Ga.

Nutrient Levels in Georgia Peach Orchards and the Development of Optimum Fertility Practices. (1) Survey representative peach orchards in State in order to study their nutrient element status in relation to yields obtained and past fertilizer practices of growers. (2) Establish methods of foliar analysis of peach tree which will most accurately indicate its nutritional status and which are interrelated most closely with yield and quality of fruit. (3) Establish optimum or critical levels of various nutrient elements in the foliage of the peach tree which are associated with optimum fruiting of the tree.

Hort., Chem. Soils 95

Hawaii

Lime Experiments on Coffee Soils. (1) Learn if very acid soils having a low lime content require application of lime for maximum production of coffee; (2) effect of lime application on level of Ca, Mg, and Zn.

Agron. and Soil Sci. 135

- Hawaii Investigations of the Nutritional Requirements of Crop Plants in Hawaii to Provide Information Which Will Serve as a Guide to Scientific Fertilization. To accumulate information by means of physiological investigation on the nutrition of crop plants in Hawaii. This knowledge is to be used as a guide in future recommendations for fertilizer treatments to maintain optimum yield and quality of crops.
Pl. Physiol. 659
- Hawaii Nutritional Requirements of Coffee Growing on Lava Rockland Soil. Learn: (1) phosphate requirements of coffee grown in rockland areas; (2) if there are any minor element requirements for high yields in rockland areas; (3) importance of frequency of fertilizer applications, timing, and kind of carriers in promoting high yield in rockland areas.
Pl. Physiol. 659.1
- Idaho Nutrition of Fruit Trees in Idaho. Learn nutritional needs and work out effective and efficient means of supplying major and minor nutrients. Develop improved techniques for diagnosing nutritional deficiencies.
Pl. Physiol., Hort. 269
- Ind. A Study of Root Absorption of Fertilizers by Plants. To learn relationships that exist between nutrient uptake from localized applications of fertilizers and the plant's environment.
Agron., Hort. 797
- Ind. The Effect of Oxygen Tensions and Plant Nutrients on Nutrient Uptake Root Development. (1) Study effects of ionic concentration and ionic activity on nutrient uptake. To learn effects of: (1) O tension on rate and amount of uptake of other ions from a mono-salt solution and suspension; (3) amount of surface area or exchange capacity of colloidal material in root medium on uptake of ions at various O tensions. (4) Learn O tension at which plants fail to grow when grown at constant temperature and light in a standard medium.
Agron. 886
- La. Minor Elements in Soils. Evaluate minor elements content of major soil types by chemical and biological methods. Learn crop responses to minor element fertilization of soils and relationship and balance required between a given minor element and any of other nutritive elements or combination of elements. Evaluate merits of various minor element carriers on soils of varying physical and chemical properties. Study effects of varying levels of available minor elements on growth and quality of crops as interpreted by chemical and biological assays. Study chemical behavior of minor elements, as affected by type of clay minerals, per cent saturation, and complementary ions.
Agron., Pl. Physiol. 878

Maine

Effect of Fertilizers, Liming, and Cultural Treatments on Crops for Processing. To (1) further study amounts and ratios of fertilizer needed to produce large yields of high quality processing crops; (2) further study amounts of liming materials needed to maintain given pH and calcium levels in soil, without increasing incidence of potato scab, and effect of these different levels on yields; (3) determine most efficient placement of small amounts of lime and effect on yields; (4) study most efficient placement of fertilizer and proper time of application in rotation; (5) determine best seeding rates for peas, sweet corn, and beans, and proper spacing of broccoli plants commensurate with highest yields of processing materials; (6) study effects of side-dressing applications with N at various times upon growth and quality of beans, sweet corn, and broccoli; (7) study and improve planting, cultivation, and harvesting practices for processing crops; (8) determine adaptability of new varieties for processing in Maine; (9) study effects of growth regulators and nutrient sprays on maturation and fruit-setting in beans and peas; (10) evaluate effect of harvest date on yield and quality of beans and peas; (11) determine if early removal of primary head of broccoli can be done without reducing yield; and (12) study effect of field freezing on broccoli quality.

Hort., Agron. 74

Md.

The Role of Trace Elements in Plant Nutrition. To (1) pursue the lead and further test the theory that the role of boron in plants is one of facilitating the translocation of sugar from the leaves to the young leaves and to the stem and root tips; (2) determine if there is an additional role of boron in plants such as regulation of rate of water entry and percent moisture in plant tissues and, if so, the mechanism of action; (3) determine the role or roles of boron in germination and further growth of pollen grains; (4) determine relationship of boron to the redistribution of carbohydrates from regions of storage to other cells and tissues within stored fruits and vegetables, which should indicate if various types of internal spotting and breakdown, under boron deficiency, are caused by an inadequacy of sugar movement in absence of sufficient boron; (5) study flow of sugars from leaves to various portions of intact plants subjected to a series of boron concentrations; (6) study any and all factors that might affect water-soluble and total boron concentrations within plants; and (7) determine relationship between movement of sugar and movement of certain other substances, such as hormones, within plants.

Bot. K-8-c Coop. ARS

- Md. The Mineral Levels and Interrelationships of Mineral Nutrients in Fruit Plantings in Maryland. To learn (1) growth and fruiting response of apple trees to levels of K in range above that of obvious deficiency; (2) effects of mulching systems on mineral nutrition of apple and peach trees; (3) causal factors of a physiological disorder in apple known as "internal bark necrosis," and to effect controls for the condition.
Hort. Q-79-b
- Md. Influence of Nutrient Intensity and Balance on the Quality and Physiological Defoliation of Cantaloupes. To determine (1) level of mineral concentrations needed in substrate, and corresponding nutritional level necessary in the plant for greatest amount of growth and yield, and for highest quality, (2) effects of various methods and time of applications of mineral nutrients to obtain optimum concentrations in the soil and/or in the plant as determined from results in (1); and (3) influence of mineral levels in soil and in plant on physiological defoliation.
Hort. Q-79-c
- Md. Influence of Nutrient Intensity and Balance Upon the Yield and Quality of Tomatoes. To determine (1) levels of mineral concentration needed in the plant, and corresponding nutrient levels needed in substrate for highest yield and quality; (2) influence of mineral levels in soil and in plant upon physiological defoliation; and (3) in field trials, the most effective methods and rates of application of mineral nutrients at different stages of growth to obtain optimum nutrient levels in plant as determined above.
Hort. Q-79-E
- Md. Mineral Nutrition of the Sweet Potato With Special Reference to Cation Inter-Relationships. To determine (1) seasonal mineral nutrient uptake by sweet potato plant, and correlation of mineral uptake with enlargement of fleshy roots; (2) levels of mineral concentration in plant during growing season, associated with high crop yields; (3) effects of varying levels of cation nutrition and their interaction upon growth and yield of the sweet potato plant; (4) in field trials, the most effective methods, including timing and rate of application of mineral nutrients, to obtain optimum nutrient levels and yield response; and (5) response of sweet potato plant to minor element nutrition.
Hort. Q-79-F

- Md. Influence of Nutrient Intensity and Balance on Growth, Yield, and Quality of Cauliflower. To learn (1) mineral nutrient levels in substrate and in plant for optimum growth and head production of cauliflower, (2) influence of nutrient levels in substrate and in plant on buttoning, (3) effects of various methods and times of application of different fertilizers as related to nutrient content of plant and to plant growth and head production.
Hort., Pl. Physiol. Q-79-H
- Mass. The Formation and Source of Nitrites in Nutrient Solutions. To learn what combinations of nutrient chemicals facilitate the formation of nitrites in nutrient solutions.
Bot. 22
- Mass. The Influence of Base Exchange Capacity and of Exchangeable Ions in Soils on the Availability of Potassium and Other Cations. To (1) obtain fundamental information on influence of base exchange capacity of soils upon availability of various cations to plants; (2) determine influence of complementary exchangeable cations on availability of various other cations to plants; and (3) determine effect of cation exchange capacity of the plant roots of different plants upon uptake of various cations by the plants and find if this property of plant roots may determine "feeding power" of various plants and account for persistence of one species over another when grown together.
Chem. 27
- Mass. Boron as Related to Soil Fertility and Crop Production. To (1) study plant and soil factors influencing B needs of different plants, (2) evaluate the use of plant factors and soil tests in learning fertilizer B practices for different plants.
Chem. 28
- Mass. Effect of Nutrient Elements, Light and Temperature on Growth of Carnations. To study (1) B requirements of carnations and identify deficiency symptoms, (2) interaction of Ca and B in nutrition of carnations and establish a satisfactory B-Ca ratio for carnation production, (3) interaction of K and Mg in nutrition of carnations, and effect of high levels of K in inducing Mg deficiency in carnations, (4) effect of P levels on carnation production in soils prepared with relatively large quantities of peat moss, (5) effect of supplementary light on growth and production of carnations, (6) relationship of light duration and night temperatures for carnation production.
Hort. 61

- Mass. The Mineral Nutrition of Vegetable Crops as Related to the Incidence and Severity of Certain Physiological Disorders. Learn effects of (1) concentrations of mineral elements, especially Ca, on incidence and severity of tipburn on lettuce grown in sand culture; (2) foliar applications of Ca on incidence and severity of tipburn on field grown lettuce; (3) concentrations of mineral elements applied to the soil and/or foliage of vegetable plants where deficiencies might be suspected to be associated with physiological disorders.
Hort. 137
- Mich. Development and Standardization of Methods of Determining Nutritional Requirements of Fruit Crops. To establish reliability of plant analysis as a method of determining nutritional requirements of fruit crops.
Hort. 54
- Mich. Absorption and Utilization of Nutrients Applied to Above Ground Plant Parts. (1) Evaluate effects of climate, plant characteristics, and nature of applied fertilizer formulation upon "non-root" absorption. (2) Ascertain by greenhouse and field tests the rates (half-times) of foliar absorption of various nutrients, efficiency of fertilizer usage from foliar applications, and the magnitude of nutritional contribution to crop production. (3) Learn mechanism of foliar absorption; the mechanism and significance of foliar loss of nutrients.
Hort. 88
- Mo. Mineral Content of Alfalfa and Other Feeds Grown in Missouri. Collect (1) samples of early and late cuttings of alfalfa and associated soils from same locations as in '54 and '56 for 1 more year and from new locations for 2 years; (2) corn stover and ear and associated soil samples at silage stage from 15 test plots maintained by Dr. Marcus Zuber as was done in '56. (3) Plant, fertilize, cultivate, maintain, and collect samples from small experimental corn plot, containing varying levels of N and Mo fertilization at South Farm. Analyze (4) alfalfa samples for Ca, Mg, K, B, Fe, Mn, Cu, Co, Zn, Mo, N, S, and P soils for certain of these; corn and soils for same minerals; corn samples for nitrate and total N and Mo, and soil samples for Mo.
Chem. 147
- Mo. Energetics of Ionic Relationships in Soils and Plants. To (1) learn desirable and undesirable balances between major nutrient cations of soil in terms of energy relationships between the cations, (2) learn energy levels at which NH_4 and Na in soil interfere with the K, Ca, and Mg nutrition of the plant, (3) learn extent that energy level of H affects energy levels of Fe and Mn in soil, (4) learn energy relationship between Fe and Ca, and Mn and Ca as they affect the cationic nutrition of plant, (5) evaluate relative amounts of cations needed in different kinds of soils to establish desirable energy relationships, and (6) learn extent to which nutritional balances of soil as expressed by energy relationships are transmitted to the growing plant.
Soils 263 Coop. USDA

N. H. Nutritional Studies with Horticultural Plants. To (1) determine causes and prevention of leaf scorch; (2) study effect of animal manures on leaf scorch and nutrition, and of (3) organic compounds of mineral nutrients as compared with inorganic forms on leaf scorch and plant response in general; (4) determine factors causing mineral deficiencies; and (5) effect of mulches on mineral nutrition.

Agr. and Biochem., Bot., Hort. 41

N. J. The Boron Requirement and Metabolism of Plants. To study (1) B requirements of different species of plants grown in sand or solution culture where levels of B supply can be controlled; (2) factors affecting utilization of B, including environmental influences and interaction with other elements; (3) nature of role of B in metabolism of plants, as contribution to understanding of above.

Pl. Physiol. 502

N. Y.
(Cornell) Studies of the Efficiency of Potassium Fertilizers in Relation to Plant Growth and Composition on Various New York Soils.--1. Studies of Potassium Fertilization of Corn With Special Reference to the Effects of the Chloride Ion. Study the effects of sources and rates of potash fertilizers applied in row and broadcast upon yield and plant tissue composition; study effects of chloride ion upon yield, plant tissue composition, and drought resistance.

Agron. 176-1

N. Y.
(State) Mineral Nutrition of Fruit Plants at Various Stages in Their Development. To learn (1) effect of major mineral supplements on growth, fruiting habits, and fruit quality when applied or withheld at different stages of development of the fruit plant, and (2) significance of interaction between certain nutrients (N:K, K:Mg) with respect to fruiting habits and fruit quality.

Pomol. 14

N. C. The Influence of Plant Nutrients Upon the Development of the Peanut Plant and Upon the Quality and Quantity of Fruit Produced. To (1) characterize deficiency conditions in peanuts for all mineral elements considered to be essential for plant growth; (2) evaluate effect of different plant nutrients upon production of flowers and development of fruit; (3) characterize changes in chemical composition of different parts of plant throughout growing period; and (4) study physiological inter-relationship between boron and calcium in peanuts.

Soils 108

- Ohio Factors Affecting Growth and Mineral Absorption by Plants.
2. The Influence of Hydrogen Ion Concentration in the Absorption
of Minerals by Field Crop Plants. To interpret the effects of
hydrogen ion concentration on plant growth when other factors
of the nutrient media are held constant.
Agron. 1-2
- Ohio Use of Foliar Applied Manganese in Correcting Manganese
Deficiency in Agronomic Crops. To learn (1) rate and solution-
volume of foliar applied Mn required to obtain adequate correction
of Mn deficiency, (2) stage of plant development most responsive
to correction of Mn deficiency by foliar application, (3)
efficiency of absorption of foliar applied Mn, (4) effect of
environment and solution characteristics on absorption of foliar
applied Mn.
Agron. 1-5
- Ohio Effect of Magnesium and of Trace Element Applications Upon
Yield, Quality and Foliar Composition of Onions and Celery
Grown on Muck. Learn (1) precise effect of applications of Mg
and certain trace elements on growth and yield of onions and
celery; (2) their effects on quality as measured by certain
physical and chemical tests; (3) effect of applications on leaf
composition with respect to major and trace nutrient elements.
(4) Correlate yield and quality with such chemical composition.
Hort. 181
- Okla. A Study of Chlorosis of Certain Woody Ornamentals in
Oklahoma. To find the most satisfactory combination of chem-
icals and concentrations, and methods of application to correct
the conditions causing chlorotic foliage of Pin Oaks, Thunberg
spireas, and other affected plants under Oklahoma climatic and
soil conditions. To determine if a practical correction of
chlorosis of the plants being tested can be obtained by lower-
ing the pH of the soil.
Hort. 866
- Pa. The Use of Surveys to Determine "Optimum Values" of
Nutrient-Element Leaf Concentrations. To determine leaf con-
centrations of various essential elements in major horticultural
crops which are associated with desired responses as affected
by fertilization, soil, and climatic conditions.
Hort. 874-A
- Pa. Nutrient-Element Deficiencies in Horticultural Crops.
To study (1) use of leaf analyses in confirming visual diag-
nosis; and (2) value of various nutrient-containing materials
in correcting these symptoms when applied to soil or as
foliage sprays.
Hort. 874-B

- Pa. A Study of Leaf Analysis Techniques. To (1) study methods of improving the techniques involved in sampling and preparing leaf samples for analysis; and (2) develop improved analytical procedures for leaf analysis.
Hort. 874-C
- Vt. Effect of Fertilizer Nitrogen on Availability and Uptake of Plant Nutrients. (1) Learn effect of different rates, forms, and modes of application of N, on plant uptake and availability of soil K, P, Ca, and Mg. (2) Study influence of N fertilizers on legumes in relation to establishment, nodulation, N, and mineral content of legume plants.
Agron. 67
- W. Va. Nutrition of Apple Trees in West Virginia. In a urea study, learn (1) most efficient and economical use of N applied as spray; (2) if N reserves in apple trees can be maintained by N sprays alone; and (3) effect of N sprays on biennial bearing, fruit size, fruit color, storage life, and fruit set. In study of nutrient status of apple orchards, (1) evaluate nutrient status of commercial orchards as learned by leaf analyses for N, P, K, Ca and Mg; and (2) learn where in the State, nutrient deficiencies might be appearing and to what extent such a situation may exist.
Hort. 16
- W. Va. Nutrient Availability in Relation to Soil Structure. To learn effect of (1) soil structure on nutrient availability as measured by chemical and biological tests of availability and plant tests of nutrient absorption; (2) increased nutrient content on crop yields in soils with poor structure.
Agron. and Genetics 106 (NE-11)
- W. Va. The Possible Relationship of Metallic Ion Toxicity to Drought Injury in Shade and Forest Trees. Learn (1) identity and concentration of metallic ions associated with injury, (2) types of injury with which presence of high concentrations of potentially toxic ions are associated as stem cankers, pimple-type bark swelling, die-back of stems and roots, etc., (3) Species of shade and forest trees found affected; oaks, black cherry, maple, yellow poplar, and others, (4) Geographical distribution pattern of types of drought injury related to high concentrations of toxic ions, (5) Point of origin and nature of initial injury to tissues of affected trees and response of adjacent tissues to near presence of injury, (6) Ways in which injury may be artificially induced under controlled conditions.
Ent., For., Pl. Path., Bact. 109

- Wis. Relationship of Plant Nutrition to Disease Incidence and Expression of Symptoms. To learn influence of various (1) plant nutrient ratios and levels on visual expression of certain potato virus and other diseases, (2) nutrient ratios and levels on plant, susceptibility to diseases and their effect on yields, (3) nutrient ratios and levels on behavior of virus in plant, measured quantitatively, (4) potato virus diseases on nutrient uptake by plant.
Ent., Pl. Path., Soils 774
- Metabolism
- Del. Non-Cellulosic Constituents of Plant Cell Walls. Study composition of plant cell walls with special reference to non-cellulosic constituents.
Agr. Chem. 25C
- Fla. The Biosynthesis of Lysin and Tryptophan. Learn mode of synthesis of the amino acids, lysine and tryptophan in higher plants.
Bot. 810
- Ill. The Occurrence and Activity of Glycolytic Enzymes in Corn. To (1) determine if glycolytic enzyme system can be detected in corn seeds and seedlings using methods which have been shown adequate with other plants; (2) determine presence and degree of activity of glycolytic enzyme system in various inbred lines and hybrids of corn; and (3) isolate and characterize specific enzymes such as aldolase and triose phosphate dehydrogenase which play key roles in this metabolic system.
Agron. 15-371
- Ill. Relation of Light, Nutrients, and Carbon Dioxide to the Metabolism of Corn Plant and to Its Yield of Stover and Grain. To learn (1) relation of light to composition and to yield of stover and grain per plant of corn at different rates of planting, (2) relation of CO₂ content of air to composition and to yield of stover and grain per plant of corn at different rates of planting, (3) metabolism of corn plant and its response to different light, CO₂, and nutrient conditions.
Agron., Pl. Physiol. 15-377
- Ill. Physiology of Maturation and Ripening of Tomatoes. Determine factors affecting developmental and ripening changes in tomato fruits and accumulate information about the ripening mechanism.
Hort. 65-345

- Ind. An Investigation of the Effects of Potassium and Phosphorus Deficiency on Nitrogen Metabolism in Plants.
 (1) Learn effect of K deficiency on free amino acid distribution of plants; (2) effect of K and P deficiency on free amino acid content and relative amount of plant protein fractions. (3) Test for presence of the Krebs urea cycle in higher plants with aid of C^{14} labeled glutamic acid.
 Biochem. 899
- Kans. The Roles of Zinc and Iron in Alfalfa and the Composition of Zinc Containing Substances in Alfalfa. Learn nature of chemical substances in plants to which Zn is bound, rate of uptake of Zn by plants grown in nutrient solutions, under various conditions and the relationship of Fe and Zn in plants, if such exists.
 Bot., Chem. 328
- Ky. A Study of Biochemical Mechanisms in the Genus Nicotiana. Learn more about fundamental biochemical processes of tobacco plants--how they are affected by genetics and physiology of plants-- and to apply that knowledge to improvement of smoking quality of Burley tobacco.
 Agron. 170
- Minn. Enzymes Concerned with the Synthesis of N-Methyltyramine and N-Dimethyltyramine in the Barley Root. Demonstrate that decarboxylase and methylase do occur in growing rootlets and investigate their properties to see if they occur in mature roots which no longer product NMT and DMT.
 Agr. Biochem. 1519 Coop. NSF
- Nebr. Enzymatic Synthesis and Structural Characterization of Carbohydrates. Investigate (1) biosynthesis of lactose in mammary gland, (2) enzymatic synthesis and structure of galactosyl oligosaccharides in plants, (3) pathways of synthesis of galactosyl oligosaccharides in plants, (4) mechanism of synthesis and deposition of starch in plants.
 Biochem. and Nutr. 448 Coop. NSF
- N.Y.
 (Cornell) Intracellular Respiratory Systems in Plant Tissues. To (1) obtain information on properties of individual respiratory enzymes in plant tissues; (2) investigate manner in which individual enzymes are linked together into organized respiratory systems; and (3) investigate mechanisms whereby complete respiratory system of plant tissues is capable of producing energy required for physiological activities which are exhibited by intact plant.
 Bot. 75

- N. Y.
(Cornell) The Nitrogen Compounds of Plants and Their Metabolism.
To (1) recognize, isolate and identify new soluble N compounds that occur as constituents of plants and determine their mode of origin and their function; (2) characterize protein fraction of plants by hydrolysis and quantitative estimation of amino acids so produced; and (3) investigate effects of nutritional and environmental factors on soluble and insoluble N fractions.
Bot., Pl. Breeding, Pl. Path. 76
- N. Y.
(Cornell) Studies on the Basal Metabolism Rate of Various Apple Varieties. To use the measurement of the basal metabolism rate (respiration rate) of apples to build up a store of information that may be used in practical application.
Pomol. 138
- N. C. A Study of the Cytochrome System of Higher Plants in Relation to Iron Requirements and Factors Affecting Iron Metabolism. To (1) determine if cytochrome c reductase of plants contains iron as an integral portion of enzyme, and study certain nutritional and other factors that may affect activity of this enzyme system; and (2) purify cytochrome oxidase enzyme of higher plants and determine nutritional and other factors that may affect activity of this enzyme.
Bot. 36 Coop. USDA
- N. C. Factors Influencing the Biosynthesis of Carotenoids by Yeasts. (1) Identify and characterize carotenoid pigments produced by species of yeast in genera Rhodotorula, Torulopsis, Cryptococcus and related genera; (2) learn influence of cultural conditions on carotenoid production by yeasts in these genera.
Chem. 41 Coop. ARS
- Oreg. Respiration and Intermediary Metabolism in Economic Plants. To (1) determine respiratory mechanisms, energy-yielding reactions, and oxidase systems operative in economically important plants; and (2) develop methods for investigating practical problems which involve effects of abnormal or adverse conditions upon metabolic reactions of plants.
Agr. Chem. 149
- Pa. Determination of Oxidative Enzyme Systems and Oxidative Pathways in Higher Plants. To (1) develop and improve techniques for detecting presence and measuring the activity of oxidative enzymes; (2) determine presence and activity of oxidative enzymes in higher plants; and (3) relate presence of oxidative enzymes to metabolic pathways in higher plants.
Agr. and Biol. Chem. 1218

- Pa. The Initiation of Synthesis, Biological Stability and Mechanism of Formation of Adaptive Enzymes in Micro-Organisms. To (1) study mechanism of induction of enzyme syntheses, (2) investigate in vivo stability of adaptive enzymes of cells under stresses and of availability of constituent amino acids for other syntheses, (3) study specific effects of environment on formation of adaptive enzymes.
Biol. Chem. 1253
- Pa. Biochemical Effects of Phosphorus and Nitrogen Deficiency in Algae and Higher Plants. To learn (1) metabolic reactions most sensitive to P and N deficiencies, (2) phosphorylation mechanisms (source of ATP) in P-deficient plants and their dependencies upon nutrient P, (3) phosphorylation of heptoses and pentoses in plants, (4) primary effects of N deficiency upon free amino acid and protein bound amino acid concentration.
Biol. Chem. 1254
- Pa. Oxidative Metabolism of Bacteria. (1) Learn metabolic reactions by which bacteria oxidize carbohydrate to completion. (2) Relate oxidative metabolism of bacteria to reactions by which energy is trapped and synthetic C skeletons are formed. (3) Learn relationship between oxidative metabolism and photo-metabolism in photosynthetic bacteria.
Bact. 1265
- Pa. Terminal Oxidases of Plants. (1) Identify and characterize terminal oxidases in higher plants. (2) Study changes in terminal oxidase activity as a function of tissue age. (3) Estimate extent to which terminal oxidases in plant tissues participate in absorption of molecular oxygen in vivo.
Bot., Pl. Path. 1337
- Utah The Effects of Fluorides on Certain Enzymes Present in Selected Plant and Animal Tissues. To (1) investigate general physiological basis of fluorine toxicity in plants, including effects on water relations of leaves, toxicity symptoms, respiration and photosynthesis, (2) learn effects of different levels of soluble fluorides on esterases, phosphorylases, transphosphorylases, phospho-isomerases, dehydrogenases, and enzymes involved in metabolism of carbohydrates in selected plant tissues of known genetic origin, (3) learn effects of different levels of soluble fluorides on esterases, phosphorylases, transphosphorylases, phospho-isomerases, dehydrogenases and enzymes involved in metabolism of carbohydrates in selected animal products, blood, bone marrow, liver, kidney, heart, and other muscles of various farm animals fed under known conditions, (4) correlate possible changes in enzyme systems with histo-chemical changes which occur in plants and animals exposed to different levels of soluble fluorides.
Bot., Anim. Husb., Dairy Husb. 457 (W-39)

Vt. The Role of Boron in Plant Metabolism. (1) To learn a specific metabolic function for B in plant nutrition. (2) If a specific site of action can be shown, to use this data to correlate the divergent physiological roles now ascribed to B.

Agr. Biochem. 45

Wash. Metabolism of Germinating Peas. To study nature of reactions which take place during germination of pea seeds, mechanisms by which reactions are controlled, and resulting changes in constituents of plant.

Agr. Chem. 769

Growth and Growth Regulators

Calif. Plant Growth Regulators in Relation to the Physiology of Citrus. To (1) determine the manner in which mature fruit drop, increased fruit size and increased storage life of citrus may be regulated by the use of plant hormones, investigating effects of plant growth regulators on photosynthesis, respiration, transpiration, translocation, cell elongation, etc.; (2) evaluate new or partially field-tested materials for their effects on functioning of plants, using lab and greenhouse techniques; and (3) investigate possibility of extending use of plant growth regulators to control of other plant processes, using information developed under (1).

Pl. Biochem. 1346

Calif. The Physiology of Abscission in Horticultural Plants. (1) Learn environmental and internal factors affecting auxin gradient at abscission zone. (2) Study associated morphological phenomena.

Bot. 1357

Calif. Influence of Plant Regulators on Growth and Fruiting of the Vine. (1) Screen for compounds that effect the vine differently or which produce similar but better responses than those already obtained. (2) Work on elongation of cluster and their branches. (3) Study relation of plant regulators to the carbohydrate nutrition of the vine.

Vitic., Enol. 1421

Calif. Factors Affecting the Abscission Process in Relation to Defoliation in Cotton. To learn of the physiological factors affecting abscission and to develop more reliable and efficient methods of defoliating cotton.

Bot. 1581 Coop. USDA

- Calif. Physiological Effects on Fruit Plants of Chemicals Other Than Fertilizers. To learn (1) nature of injury and conditions under which it occurs from the use of a suspected chemical on fruit plants; (2) long-term effects of a suspected chemical on fruit plants; (3) if there are conditions under which a suspected chemical may be safely used.
Pomol. 1704
- Colo. Chemical and Biological Investigations of Plant Growth Regulators. To investigate (1) normal and abnormal metabolites as influenced by natural and synthetic plant growth regulators; (2) effects of environment on reactions of organisms to natural and synthetic plant growth regulators; (3) biological and chemical mechanisms of action of natural and synthetic regulators; (4) effects of the regulators on quality and nutritional character of crop plants; and (5) to synthesize or isolate plant growth regulators that may be needed in carrying out the above.
Bot. 80 Coop. USN
- Conn. Biochemical Processes Underlying Growth Regulation in Eastern Hemlock (*Tsuga canadensis*). To explore biochemical processes explaining effects of light and temperature on annual growth cycle of eastern hemlock; breaking of seed of bud dormancy, terminal and lateral stem elongation, and return to dormancy.
For. 420
- Del. Flower and Pod-Drop of Lima Beans. Find method to reduce flower and pod drop caused by unfavorable growing conditions, with emphasis on Ford-hook type.
Hort. 37-H
- Del. Control of Growth and Fruiting of Strawberry by Spray Application of Growth-Regulating Chemicals. To (1) determine effectiveness of chemical plant thinning and plant spacing on vigor and yield of strawberry; (2) test efficacy of certain chemicals in regulating runner growth of certain strawberry varieties; and (3) test efficacy of certain chemicals in promoting fruit set and/or maintenance of berry size.
Hort. 51-H
- Fla. Effect of Growth Regulators in Production and Quality of Certain Nut and Fruit Plants. To determine effects of growth regulators on (1) thinning of excessive nut set in pecans to improve quality and reduce biennial bearing; (2) reduction of winter chilling requirements for breaking dormancy of several fruits; and (3) delay of flowering to reduce spring frost hazards at blossoming time of fruits.
Fruit Crops 599

- Fla. The Physiological Basis of the Periodicity of Growth in Fruit Trees. Learn physiological mechanism controlling dormancy of fruit trees.
Fruit Crops 877
- Ill. The Relation of Hormones, Ascorbic Acid, Ascorbic Acid Oxidase, and Other Compounds in the Development of Functional Ear Shoots of Corn. To (1) determine cytological and biochemical processes involved in the development of ear shoots of corn; (2) determine effects of pollination of subsequent biochemical and cytological changes of ear shoots of corn; and (3) investigate nature of growth regulating substances involved in ear and kernel development in corn.
Agron. 15-370
- Ind. The Physiology of Flowering and Fruiting of Selected Plants. To (1) determine nature of physiological processes responsible for flower initiation; (2) determine nature of physiological processes responsible for fruit development; and (3) apply these findings to horticultural crops.
Hort. 662
- Ind. Nature and Mode of Action of Some Germination Inhibitors Found in Dormant Seeds. Isolate, purify and characterize (1) active antigermination factors from dormant seeds; (2) protein-splitting enzymes susceptible to above factor. (3) Test other proteinase inhibitors to see if antiproteinase activity is capable of inhibiting germination. (4) Test products resulting from protein-cleavage on dormant or inhibited seeds to see if they can induce germination.
Biochem. 959 (NCM-23)
- La. Separation and Characterization of Growth Promoting Substances in Plant Extracts. Isolate and identify microorganisms requiring for maximum growth addition of certain plant extracts to a medium containing all known B-vitamins. Study chemical, physical and biological properties of substances. Develop methods of isolation and purification. Identify or characterize isolated factor(s).
Agr. Biochem. 865
- La. Development of Techniques and Evaluation of Chemicals for the Defoliation and/or Second-growth Inhibition of Cotton. (1) Screen and evaluate new chemicals as defoliant and second-growth inhibitors, (2) study process of abscission and second-growth inhibition, (3) develop ground spray machines for field application of defoliant and/or second-growth inhibitors, (4) evaluate different nozzles and nozzle arrangements, (5) determine proper spray volume and rate of chemical, and (6) evaluate concept of bottom defoliation as an aid to reducing boll rot.
Agr. Engin., Pl. Path. 885

- Md. Chemical Thinning of Apples and Peaches. To (1) determine response of heavy-fruited major varieties of apples to post-bloom chemical thinning sprays and margins of safety for each variety; (2) study effects of time of application and concentration of chemicals on thinning of apples and peaches by means of post-bloom sprays; (3) develop satisfactory method of chemical thinning of peaches in post-bloom period; and (4) determine possibilities of reducing biennial bearing of major apple varieties by chemical thinning.
Hort. I-74-B
- Mass. Influence of Chemical Treatments on Flowering and Fruiting of Fruit Trees. Improve the size, color and quality of fruit on heavily bearing fruit varieties by the use of chemical thinning materials. Prevent wide fluctuations in the productivity of fruit trees, especially apple varieties, which have a tendency to bear heavily in one year and be practically barren the following year, by the use of chemical thinning techniques. Reduce the hazard of spring frost damage, which may not only reduce or eliminate the current year's crop but also may tend to make even generally annual bearing apple varieties alternate for several years, thereafter, by delaying the time of blossoming with some chemical or other treatment. Improve the set on fruit varieties, which because of climatic conditions or lack of pollenizers fail to set full crops, by the use of hormone materials or improved methods of pollen dissemination.
Hort. 95
- Mich. Agricultural Application of Growth Regulators and Their Physiological Basis. To (1) develop physiological studies to enhance understanding of mechanism of action of plant growth regulators; (2) find new materials and methods to apply to crop production practices; and (3) find new uses for materials already available.
Hort., Agr. Chem. 55
- Mich. Control of Flowering and Fruiting in Vegetable Crops. Define environmental conditions which control flower formation and development. Evaluate reproductive and vegetative responses to chemical treatment. Promote earlier flowering and fruiting through chemical treatment and controlled environment and develop practical basis for these methods in commercial production. Study biochemical and morphological aspects of flowering.
Hort. 89
- Mich. Translocation of Plant Growth Hormones as Modified by Alanap Treatment. Investigate the possibility of controlling plant growth by application of compounds which effect the plants ability to translocate its own internal growth hormones.
Bot. and Pl. Path. 827

Minn.

Physiological Studies of Fruit Crops as Related to Growth and Development. To (1) study fruit plants to learn their ability to resist low temperatures; the relationship of plant structure and physiological behavior to cold resistance; and effects of environmental or cultural factors upon survival; (2) screen new growth regulating chemicals for use in certain applicable phases of three and small-fruit production; test new or additional uses for these materials in fruit plantings; and to undertake basic physiological studies to learn mode of physiological action of the chemicals; (3) study response of fruit plants to photoperiod under controlled length of day conditions; and (4) make survey to learn general nutrient level of fruit plants in major producing areas of the state, and make mineral analyses of plant tissues to be correlated with appropriate plant responses.

Hort. 2124

Miss.

The Effects of Growth-Regulators and Environment on Fruit Set and Quality of Tomatoes Grown in Plastic Greenhouses and Under High Temperature in the Field. (1) Test methods of ventilating and heating plastic greenhouses for proper control of temperature, light, and humidity. (2) Learn effect of growth-regulators on set of tomatoes grown in plastic greenhouses and in field. (3) Study factors associated with drop of tomatoes.

Hort. HK-26

Mo.

Physiological Mechanisms of Reproduction of Horticultural Plants. To (1) make intensive investigations and evaluation of effects of major antiauxins and one or two best known auxins on flower bud initiation and development of tomatoes, beans, peas, and possibly other horticultural plants, and secure desirable set and yield of fruit after flower bud initiation and development has been achieved; and (2) determine effect of various synthetic plant growth regulators on fruit set, size and quality.

Hort. 129

Mo.

Hormone Sprays for Fruit Thinning and Control of Preharvest Drop. To (1) compare NA-Am and IPC at various concentrations with NA for thinning Jonathan and Golden Delicious apples in 2 or 3 commercial orchards; and (2) compare 2,4,5-TP at various concentrations with NA for preharvest crop control of Wealthy, Jonathan and Winesap varieties in 2 or 3 commercial orchards.

Hort. 195

N. J.

Studies of the Photoperiodic Control of Flower-Bud Formation in Strawberries. (1) Learn time and range of lower-bud initiation in several strawberry varieties and if they are Short Day, Long Day, or indeterminate plants. (2) Study inheritance of the flower-bud initiation response in progeny of Sparkle x Gem. (3) Study effect of far-red irradiation on flower-bud initiation in strawberries.

Hort. 711

N. Y.
(State)

Hormone Induced Responses in Fruit Plants with Special Reference to Flower Bud Formation and Rest Period Phenomena. To reveal nature of internal condition responsible for initiation of flower buds and provide means to control flower bud production (ultimate aim); or, more specifically, to determine (1) effect of certain hormone-like substances in hastening or delaying onset of bearing in young trees; and (2) if flower-forming hormone is responsible for converting buds from a vegetative to a flowering condition.

Pomol. 10A

Ohio

Causes of Abscission of Flowers and Young Fruits Following Applications of Synthetic Hormones and the Relation of Naturally Occurring Hormones to Such Abscission. To (1) determine causes of abscission of flowers and fruits resulting from application of synthetic hormones applied during bloom and subsequent fruit setting period; (2) measure variation in naturally occurring hormone content of developing and abscissing young fruits of several apple varieties to relate if possible such differences as may be found to particular fruit setting behavior of the variety; (3) measure effect of applications of synthetic hormones on natural hormone content of developing fruits; and (4) study effect of applications of synthetic hormones on anatomical and cytological behavior of developing ovules, embryo sacs, embryo and endosperm.

Hort. 4

Ohio

Use of Maleic Hydrazide in the Inhibition of Sprouting in Potatoes and Onions During Storage. Study effect of various concentrations and dates of application of maleic hydrazide to potatoes and onions on inhibition of sprouting of crops in storage.

Hort. 156

Okla.

Investigations on the Causes and Control of Erratic Bearing of the Pecan. (1) Learn cause/s for erratic bearing. (2) Devise a method to correct or avoid this.

Hort. 985

P. R.

The Response of Tropical Plants to the Application of Plant Growth Regulators. To determine effect of foliage sprays with maleic hydrazide and other growth regulators on suckering of tobacco, sprouting of root crops, flowering of coffee and vanilla and on other crops where hormonal regulation might be of value.

Pl. Physiol. 23

S. C.

Chemical Thinning of Peaches. To (1) determine concentration and time of application of 3-Cl-IPC on young fruit of the peach to obtain commercial thinning, and (2) test various chemicals and formulations of chemicals (growth regulators) to learn their usefulness as fruit thinning agents.

Hort. 62

Texas

The Chemical Control of Plant Growth. Obtain further information about chemical reactions which control plant growth processes as: in vivo and in-vitro biosynthesis of plant growth substances, mechanism of auxin action, nature of interaction of light, auxin, and mineral elements, (especially Zn, Mn, Co, S, K, and Mg) in controlling flowering, leaf expansion, elongation growth, dormancy, and seed germination.

Biochem. and Nutr., Pl. Physiol. & Path. 1032 Coop. NSF, AEC

Vt.

The Mode of Action of Plant Growth Hormones. Study the effect of (1) auxin on the metabolism of oats, corn, sunflower and other plants; (2) Giberellin on metabolism of oats, corn, sunflower and other plants. (3) Attempt to formulate a theory on mode of action of these compounds.

Agr. Biochem. 46

Wis.

Applications of Plant Growth Substances and Their Mechanism of Action. To amplify present applications, develop new uses for plant growth substances, determine manner in which they exert their effects, and investigate their use in controlling starch production of peas and their influence on protein content of field crops.

Agron., Biochem. 755

Wyo.

The Use of Growth Modifiers in Production of Alfalfa Seed. To (1) screen growth-modifying chemicals for influence on alfalfa seed production. (2) Test promising chemicals as learned under (1) on alfalfa under field conditions to determine practical recommendations.

Agron. 564 (W-58)

Environmental Factors

Ariz.

Factors Affecting the Production of Citrus in Arizona. To study (1) rootstock effects and nursery management, (2) adaptation of new varieties and strains, (3) soil management in relation to nutrition, (4) nutritional and growth stimulating sprays, (5) citrus irrigation, and (6) low temperature effects, surveys, grove heating.

Hort. 299 Coop. ARS

Ariz.

Influence of Climatic Factors on Fiber Properties in Cotton. To learn (1) if differences occur in fiber properties of same variety of cotton grown in various climatic areas of state, (2) if climatic factor or factors which may influence fiber property variation between areas as well as year to year variation at same time.

Agron., Pl. Breeding, Range Mgt. 380 Coop. ARS

- Ariz. Protection of Citrus Trees and Fruit From Freezing Injury. Learn most efficient methods of operation and effectiveness of wind machines and orchard heaters in raising temperatures during freezes. Investigate physiological conditions of tree in relation to tolerance to cold.
Hort. 384 Coop. USDC-WB
- Ark. A Study of the Factors Influencing Cold Injury to Peach Trees. To study environmental and physiological factors that influence susceptibility to cold damage in peach trees, giving special attention to factors that influence the initiation, intensity, and duration of rest period, in attempt to find a basis for development of techniques for modification or control of rest.
For., Hort. 209
- Ark. A Study of Factors Affecting Germination and Seedling Growth of Cotton at Low Temperatures. To study (1) effects of temperature on basic germination processes and growth of cotton (2) devise methods of increasing cold tolerance in seedling cotton.
Agron. 405 Coop. ARS
- Calif. The Effects of Fluorides on Growth, Quality, and Yields of Tree, Field and Vegetable Crops. (1) Learn phytotoxic effects of atmospheric fluorides on nutrition, growth, and, when possible, yields of important crops. (2) Investigate effects of the incorporation of soluble fluorides with various types of soils on the growth and fluoride uptake by plants grown thereon. (3) Learn effects of prolonged irrigation of crops on acid, neutral and alkaline soil with water containing soluble fluorides.
Soils and Pl. Nutr., Air Pollution 1633-B (W-39)
- Conn. Effects of Altering the Environment on the Quality of Plant Growth. Learn in vitro the systems that could cause the response of plants to environment. Chemically control systems and responses by: improving quality of produce from unfavorable environments in greenhouse and field, and by demonstrating the the importance of systems in vivo.
Soils and Climatol. 703
- Fla. Physiological Responses of Florida Forage Crops to Environmental Variables. Learn interactions of temperature, light and associated radiation, water, nutrients and management on behavior of selected forage crops.
Agron. 743 (S-12)
- Fla. The Interrelation of Environment to the Physiology and Chemistry of Plants. II. Organic Acid Metabolism of Plants in Relation to Minor Element Nutrition. Learn the organic acid content of certain species and inbred lines of plants grown under normal and deficient levels of minor elements, and relate variables to growth and quality.
Agron. 766

- Fla. Preconditioning of Plants in Relation to Cold Tolerance.
 (1) Develop a quantitative method for measuring cold tolerance. (2) Study characterized preconditioning procedures and quantitatively evaluate their effects on tolerance of plants to cold injury. (3) Evaluate genetic cold tolerance of commercial tree fruit varieties grown in Florida.
 Fruit Crops 838
- Hawaii The Growth of Sugar Cane, *Saccharum officinarum*, as Affected by Environmental and Other Factors.--Physiological Factors Influencing Organogenesis (Development of Organs) in *Saccharum*. To determine physiological factors influencing development of vegetative and reproductive organs of certain varietal hybrids of *S. officinarum*.
 Bot., Pl. Path. 653.2
- Hawaii Studies on Post-Harvest Physiology of Hawaiian-Grown Fruits, Vegetables and Ornamentals as Applied to Quality, Storage Life and Marketability. Investigate basic requirements of harvesting, transporting, handling and storage necessary to assure high quality and marketability of various plant commodities from various areas.
 Pl. Physiol. 663
- Idaho Effect of Irradiating Russet Burbank Potatoes with Radio-Active Fission Products upon Their Storage and Market Qualities, Disease Prevention and Killing of Nematodes Contained Within the Tubers. To learn (1) dosage of irradiation from fission products that will inhibit sprouting of Russett Burbank tubers, (2) effect of said treatment on taste, cooking and processing qualities, flesh color and greening of skin under normal retail conditions, (3) loss during storage due to rots, shrinkage, and sprouting compared to non-treated tubers, (4) temperature that will allow least moisture, sprout and rot loss to treated tubers, (5) how long marketing can be extended by use of treatment and still receive consumer acceptance, (6) best time for using treatment to expect best results, (7) possible effect of irradiation of tubers in delaying expression of *Verticillium* wilt through modification of dormancy, (8) if said dormancy can be broken by use of ethylene or other chemicals, and (9) if *Ditylenchus destructor* can be killed by irradiation without injuring the table quality.
 Hort. 268 Coop. AEC
- Idaho The Effect of Fluoride on Plant Enzyme Systems and the Nature of Fluorine Compounds Present in Plant Tissues. (1) Study effect of fluorides on plant enzymes of resistant and susceptible plant species. (2) Learn how fluorides exist in plant; if as an inorganic constituent or in some combination with protein, lipide or other material.
 Agr. Chem. 293 (W-39)

Ind. Factors which Influence the Yield of Cool Season Grasses.

(1) Learn relative vigor of regrowth of bromegrass when harvested at low and high fructan levels. (2) Study rate of accumulation of fructan in grass as affected by temperature, time of N fertilization with respect to harvesting, and soil moisture. (3) Learn nature and extent of fructan depletion in cool season grasses during and following anthesis.

Agron., Statis. 837

Iowa Soil and Climate Factors Affecting the Efficient Use of Water by Crops. To (1) learn moisture properties of Iowa soils (moisture holding capacity, wilting point, available soil moisture), (2) learn evapo-transpiration of different major crop covers on different soils under different weather conditions (particularly on corn), (3) investigate rate of replenishment of soil and subsoil moisture in relation to climate-crop factors, rainfall, evapo-transpiration, runoff, crop cover, and mulch, (4) develop a technique for estimating soil moisture over large areas from meteorological data and from limited soil moisture samples, (5) learn optimum soil moisture range for crop growth at different growth periods, under different air temperature conditions, (6) obtain moisture data at specific locations and times, for use in agronomic interpretations, and (7) learn root distribution and development under different subsoil moisture conditions.

Agron., Agr. Engin., Soil 1276 Coop. ARS, USDC-WB

Ky. Physiological Investigations of Red Clover. Obtain basic physiological information which will aid in improvement of red clover.

Agron., Pl. Physiol. 171 Coop. USDA

La. The Effects of Different Lengths of Dormant Period and Certain Chemicals upon the Emergence, Productivity and Storing Ability of Several Varieties of Potatoes. To (1) try to determine reason for different varieties having different rest period needs and interaction between rest period requirements and productivity of each variety; and (2) ascertain effect of certain growth regulators, applied as both pre-harvest and post-harvest treatments on storage ability and quality of standard varieties of potatoes.

Hort. 393

Mich. The Interrelation of Environment (Temperature and Relative Humidity) and Spray Chemicals on Russeting, Luster, Color and Ripening of Apple Fruits and on Physiology of Apple Leaves. To determine (1) environmental conditions and time during flower and fruit development that fruit russeting is most likely to occur from use of chemicals; (2) if injury to epidermal cells of flower and fruit is necessary for occurrence of russeting by pesticide chemicals; (3) relation between apple varieties and injury from various chemicals as influenced by temperature and humidity; and (4) interrelation of plant regulators used to control pre-harvest fruit drop and night and day temperature on rate of fruit ripening.

Hort. 116

- Mich. Factors Affecting the Germination of Weed Seeds. To determine (1) physiological characters of dormancy in weed seeds; (2) needs for testing viability of weed seeds; (3) factors affecting weed seed longevity and (4) develop methods of weed control based on such improved understandings.
Bot. and Pl. Path. 467 (NC-10)
- Mich. Effect of Photoperiod (Day Length) and Temperature on Root Initiation, and Growth of Ornamental Plants. (1) Condition plants to an otherwise unfavorable environment by use of photoperiod and temperature adjustment of environment. (2) Extend and improve vegetative propagation of ornamental plants by use of photoperiod and temperature and adjustment of environment.
Hort. 846
- Minn. Storage of Grain in Various Atmospheres in Sealed Bins. To learn effects of various atmospheres on the microbiological, entomological and biochemical factors that influence the quality of stored grains, especially wheat, corn and soybeans.
Agr. Biochem. 1517
- Miss. Investigations on Winter Hardiness: Studies on Certain Physiological and Pathological Aspects of Freezing Injuries of Small Grains. Physiological studies: effect of some electrolytes and other diffusible substances on degree of freezing injury. Pathological studies: predisposition of small grains to action of root parasites following exposures to freezing temperatures.
Pl. Path. HL-3
- Mont. Factors Affecting Sagebrush (*Artemisia tridentata* Var. *Tridentata* Nutt.) Seed Germination. To determine effect of temperature, moisture, and other factors on the capacity of sagebrush seed to germinate, in order to develop a sounder basis for prediction of success of artificial measures leading to the reduction of sagebrush stands.
Agron. and Soils, Bot. and Bact. 924 (W-25)

Nebr.

Factors Affecting Bud Dormancy in Plants. To determine nature of bud dormancy in plants and to develop weed control measures based on such findings. Field and greenhouse work will include: Establish the phenology of several economically important weed species relative to breaking and including bud dormancy. Measure effects of day length, day and night temperatures and moisture levels under controlled greenhouse conditions. Attempt to accumulate continuous air and soil temperatures. Measure effects of control practices on bud production, visability and vigor. In the lab, work falls under 3 major fields: 1. biochemical analysis of plant and bud tissues to determine inherent control mechanisms such as enzyme levels, hormones, growth substances, carbohydrate levels, etc. 2. determine effects of varying nutritional levels through use of tissue culture technique using excised buds. Compare proteins, amino acids, carbohydrates and enzymes. 3. screen and develop chemicals which may have value in inducing or breaking bud dormancy, starting with ethylene chlorohydrin, indoleacetic acid, phenoxyacetic acid and urea derivatives.

Agron. 478 (NC-10) Coop. ARS

N. H.

Effects of Light Quality on Plant Growth. To determine effects of light from various white and colored fluorescent lamps, alone and in combinations with light from incandescent lamps, on plant growth.

Bot. 91

N. J.

Effects of Plant Environment on Vegetables in New Jersey. To learn (1) needs among different varieties of vegetable crops in chemical and physical environment for best growth, yield and quality of product, (2) yield for various crops grown on irrigated vegetable fertility plots, (3) effects of use of nitrified materials as sidedresser, and (4) more about timing of irrigation by measurement.

Ent., Hort. 340

N. J.

Influence of Environment and Cultural Practices on Tomato Maturity, Yield and Quality. (1) Initiate early flowering in fresh market and commercial canning varieties. (2) Develop a practical method of forecasting time of maturity. (3) Establish relationships of several elements of climate to tomato fruit production and quality by means of correlation analyses. (4) Develop a practical method of storing seedlings to accomplish vernalization and at same time make available more greenhouse or frame space.

Hort. 357

N. J.

Factors Influencing the Storage Life of Apples. To learn factors (1) related to occurrence of apple scald, (2) affecting moisture loss and nest rot, (3) operative under storage conditions affecting storage life.

Pl. Path. 478

- N. C. Study of Factors Influencing the Effect of Sub-Freezing Temperatures on Peach Tree Survival. To learn relationship between (1) rest period and hardiness, and (2) hardiness and growth substances in tree.
Hort. 87
- N. C. Winter Hardiness in Woody Ornamental Plants. Learn (1) number of applications of N that can be made in a growing season to safely obtain maximum growth and a healthy condition in woody ornamentals, without risk of cold injury caused by fall freezes; (2) effectiveness of different concentrations of maleic hydrazide in bringing about a hardening of tissues for protection against low winter temperatures; (3) effects of P and K applied on September 1 and October 1 in promoting resistance of plants to low temperatures. (4) Compare N sources in relation to plant response; i.e., a source of readily available N (NH_4NO_3), and 1 known to release N at a much slower rate (not readily available), Uramite.
Hort. 133
- N. Dak. Low Temperature Endurance in Corn. To (1) test and evaluate ability of corn inbred lines to germinate and develop in seedling state at sub-optimum temperature; (2) study association between a. ability to germinate and grow at sub-optimum temperature and ability to resist slight freezing in early seedling stages; and b. ability to germinate and grow at sub-optimum temperature and some morphological, physiological or pathological character of corn plant or kernel; (3) study effect of environment under which seed is produced upon reaction of progeny grown at low temperature; and (4) study rapidity of germination and ability to produce good stands under adverse, cold, wet soil conditions.
Agron., Pl. Physiol., Bot. 6-7
- Pa. Light and Temperature Effects on the Growth of Greenhouse Roses. To study the effect of various night temperatures in relation to natural light conditions upon the flower production and keeping quality of greenhouse roses.
Hort. 1232-B
- Pa. Factors Affecting the Keeping Quality of Cut Flowers. To learn (1) effects of chemical preservatives, growth regulators, and pH levels of solution on keeping quality of cut flowers at room temperature; (2) influence of humidity, air temperature, air movement, ethylene, and CO_2 accumulation in storage chambers on subsequent keeping quality of cut flowers.
Hort. 1280

- P. R. Factors Affecting Seed Germination Under Tropical Conditions.
 (1) Learn how germination capacity of seeds produced in Puerto Rico is influenced by changes in environmental factors during production and conservation. (2) Develop better techniques of seed production and conservation to secure maximum percentages of germination of seeds used for crop production.
 Pl. Physiol. 25
- P. R. Effects of Photoperiod on Growth and Development of Tropical Plants. To find any lighting procedures that will make possible the control of growth and differentiation of plants in the tropics and to study light requirements of such plants in relation to other environmental factors.
 Pl. Physiol. 52
- Tenn. The Effects of Certain Atmospheric Effluents upon the Growth and Composition of Plants and upon Animal Life, at Locales in East and Central Tennessee. To ascertain the verity of numerous contentions that the harmful effect upon growth and composition of crops and the severe effects upon livestock in certain locales are attributable to effluents released from nearby manufacturing operations; to establish the causal factors for any such determined effects; and to propose remedial measures and to demonstrate their efficacy.
 Agron. 50 Coop. TVA
- Va. Maturity and Physiological Responses of Apples as Influenced by Fertilization, Spray Practices, Environmental Conditions, Harvesting and Handling. (1) Develop maturity standards for harvesting apples for early market and for cold storage. (2) Learn influence of weather and cultural practices on quality, condition, and storage life. (3) Evaluate influence of spraying, fertilization, harvesting and handling practices on quality, condition and storage life.
 Hort. 86006
- Vt. Factors Influencing the Growth and Yield of Sugar Maple Trees. (1) Evaluate producing trees as to sap quality and yield and develop methods for selecting high-yielding specimens. (2) Survey variability in young maples and study its relation to adult performance in stocks of known and unknown genetical composition. (3) Evolve sugarbush management practices for cut-over areas and abandoned fields, already supporting stands of young trees. (4) Study role of climatic conditions in influencing productivity.
 Bot. 41

- Wash. Symptoms and Effects of Fluoride Fumigation on Various Ornamental and Crop Plants. To learn (1) and record photographically the sensitivity of forest, ornamental, vegetable, and agronomic plants to small quantities of atmospheric fluoride, (3) rate and extent of fluoride up-build in plants exposed to fluoride-contaminated air, (4) fluoride content of forest, horticultural, and agronomic plants grown in Spokane area, and (5) by terminal and/or radial growth studies if any common fruit or ornamental tree species in Spokane area have been adversely affected by fluoride from local industrial operations.
Pl. Path. 1143 (W-39)
- Wash. The Nature of Resistance to Fluoride Fumigation Found Among Ponderosa Pine, Prunes, Apricots and Gladiolus. (1) Correlate stomatal numbers, size, and position with reaction of Pinus ponderosa, Prunus armeniaca, Prunus domestica, and Gladiolus plants to fluoride fumigation. (2) Correlate cuticular thickness, epidermal thickness and other morphological features of given plants with reaction of those plants by hydrogen fluoride. (3) Learn influence of 30 species of Prunus rootstock on response of 4 commercial prune varieties and 4 commercial apricot varieties to fluoride fumigation.
Pl. Path. 1322 (W-39)
- Wyo. Drought Resistance Studies with Winter Wheat Seedlings. Obtain selections of winter wheat exhibiting drought resistance in seedling stage. Learn heritability percentage of same, and potential of selected strains as possible new varieties or improved selections of the variety Cheyenne.
Agron. 603
- Plant Chemistry
- Ala. The Market Value of Peanuts as Affected by Changes in Chemical and Physical Properties During Storage. To learn (1) effects of storage on chemical, biochemical and physical changes in peanuts; (2) relationship of initial quality of peanuts to changes during storage; (3) relation of microflora to respiration and associated deteriorative changes in peanuts; and (4) relationship between chemical, biochemical and physical properties and changes in odor, flavor and certain nutritive factors affecting market value of peanuts.
Bot., Pl. Path. 570
- Calif. The Chemical Constitution of Carbohydrates and the Mechanisms of Their Formation and Breakdown. To obtain information on fundamental structure of the complex carbohydrates (chiefly of plant origin) and biochemical mechanisms through which they are formed and broken down. Carbohydrates to be included are: sucrose, starch, inulin, galactans, pentosans, seaweed polysaccharides, such as glucosan produced by crown-gall organism, etc.
Biochem. 666

- Colo. Isolation and Identification of the Polyphenols of Crop Plants and a Study of Their Properties and Biochemical Functions. To (1) quantitatively estimate polyphenolic constituents of crop plants with reference to plant parts used for food; (2) separate and identify principal polyphenols of specific plant species and varieties; (3) study and consider properties of polyphenols separated and identified; and (4) establish various biochemical functions for polyphenols isolated.
Bot., Chem. 92 Coop. USDA
- Conn. Components of Cigar Tobacco Leaf Which Contribute to Market Quality, in Particular to Odor. (1) If possible, identify chemically substances in fermented tobacco which give its characteristic odor. (2) Study manner in which these substances arise and how the quantity present can be altered or controlled.
Biochem., Pl. Path. 206
- Hawaii The Form of Nitrogen in Grasses Following Nitrogen Fertilization. To (1) determine forms and distribution of N in Panicum and Napier grasses, and (2) study relationship of N to phosphorus and potash in Napier grass.
Soils, Agr. Chem. 622.5
- Mass. The Chemistry of Raspberry Canes in Relation to Cold Hardiness. Learn (1) dehydration intensities necessary to cause injury to a significant number of cells of raspberry canes; (2) water sorption isotherms on cane tissue during winter season and degree and extent of hysteresis; (3) seasonal variations in content of soluble protein, amino N, pectic substances, etc. (4) Try to find relation between dehydration intensities, sorption data, and chemical composition.
Chem. 97
- Mich. The Chemical Determination of the Carbohydrate Fraction in Various Forage Crops and Their Isolation and Identification. (1) Investigate suitability of existing chemical methods for learning various carbohydrates in forage crops and devise new methods whenever necessary. (2) Make systematic chemical study of carbohydrates in forage crops consumed by ruminants. (3) Investigate environmental conditions influencing composition of forages. (4) Make digestion trials on forages when feasible.
Agr. Chem., Dairy Indus., Pl. Physiol. 811 (NC-25)
- Mont. Determination of Magnesium in Plant Materials by Flame Spectrophotometry. To (1) determine quantitatively effects of common anions on magnesium flame intensities; (2) determine quantitatively effects on common cations on magnesium flame intensities; and (3) incorporate results obtained into an effective, rapid procedure for routine determination of magnesium in plant materials.
Chem. 933

- N. H. The Hemicellulose of Forage Crops. To determine what differences occur in the hemicelluloses of forage crops (1) in different parts of the plant, and (2) as the plant matures.
Agr. and Biol. Chem. 47 Coop. USDA
- N. J. A Study of the Formation of Pectic Substances. To furnish some information concerning the synthesis of pectic substances.
Pl. Physiol. 505
- Ohio Use of the Spectrograph for Analysis of Soil Extracts and Plant Materials. To develop spectrographic techniques for analysis of soil extracts, extracts of coal strip-mine spoil material, and plants.
Agron., For. 87 Coop. ARS
- Ohio Development of X-Ray Diffraction Techniques for Plant Materials. To develop new techniques and modify existing ones of determining presence and molecular structure of mineral salts in studies of mineral nutrition of plants.
Agron. 89 Coop ARS
- Texas The Chemistry of the Poisonous Plants of Texas. (1) Isolate and identify chemical compounds responsible for harmful properties of poisonous plants growing on range. (2) Learn effect of season of year and weather conditions on amount of poisonous substances contained in plants. (3) Develop antidotes against these chemical substances.
Biochem. and Nutr. 919
- Plant Anatomy, Morphology, Histology and Cytology
- Colo. Vascular Tissue Differentiation in Alfalfa Roots as Influenced by Their Ionic and Physical Environment. Investigate vascular tissue differentiation of alfalfa roots grown in lab and greenhouse in soils providing the following environmental conditions: variation in ratios of adsorbed Ca and Na; in type and amount of soluble salts; in degree of aggregation of soil particles.
Agron. 202 (W-47)
- Hawaii Pollination, Fertilization and Post-Fertilization Requirements of Passion Fruit and Other Plants of Commercial Potential in Hawaii. To determine factors involved in pollination, fertilization and post-fertilization of passion fruit and other types of commercial potential, specifically to determine: 1. extent of self-and cross-compatibility; (2) factors responsible for self-sterility and differences in compatibility; and (3) factors responsible for malformation of fruit.
Pl. Physiol. 662

- Ill. Morphological Studies of Certain Agronomic Crops. To study (1) morphological development of corn, wheat, oats, soybeans, etc., and describe initiation and development of primordia of parts of plant; (2) cycle of development of above in different seasons and under different growing conditions, learn when different seasons and under different growing conditions, learn when different stages of development of plant occur and duration of each stage; (3) morphological characteristics of above in relation to corn and stem rust, strength of stalk or stem, and other agronomic characteristics; and (4) developmental morphology of certain aberrant types of corn, wheat, oats, soybeans, etc.
Agron., Pl. Physiol. 15-374
- Wis. The Effect of Excessive and Deficient Nutrient Supplies on the Anatomy of Selected Horticultural Crops. (1) Learn effect of different nutrient levels on growth of stem, leaves and roots; leaf symptoms and flowering. (2) Study anatomical structure of stem and leaves.
Hort. 319
- Soil-Plant Relations
- Ark. Root Development of Forage Crop Species as Influenced by Physical and Chemical Factors of the Soil. Make lab., greenhouse and field investigations of: (1) factors influencing root growth; (3) field study and control of root growth (seasonal variations in number and extent of roots, correlation of environmental factors with number of roots and extent of root system).
Bot. 427 (W-47)
- Calif. Factors Influencing the Re-Establishment of Peach Orchards on Old Peach Soils. To discover and devise methods for preventing the peach replant growth depression.
Pomol. 1126
- Calif. Brush Seedling Establishment and Growth in Relation to Soil Fertility Levels. To determine (1) if brush increase is related to soil fertility level; and (2) to what extent brush can be controlled by increasing soil fertility through fertilization.
Agron., For., Soils 1570 (W-25) Coop. SCS
- Fla. The Maintenance of Soil Fertility under Permanent Pasture. To (1) study effects of different soil types and various management practices on yields, composition of forage and animal response; and (2) effect of these practices on physical and chemical characteristics of soil and on maintenance of soil fertility.
Soils 404

- Ill. Soil Moisture as a Factor in the Growth and Yield of Corn.
 To (1) obtain quantitative information on relation between different levels of soil moisture deficiency and growth and physiologic behavior of corn at different growth stages; (2) determine efficiency of water use by corn at different levels of soil moisture deficiency under fertility conditions and plant populations conducive to high yields; and (3) relate water use by corn to open-pan evaporation and other climatic characteristics.
 Agron. 15-373 Coop. ARS
- Ill. Effect of Planting Method, Slope, Crop, and Weather Conditions of Soil and Water Losses and Yields. (1) Learn effect of seasonal variations in weather on soil and water losses from land used in production of corn. Study (2) effect of slope on soil and water losses during production; (3) planting methods and their effect on soil and water losses and yields.
 Dixon Springs 40-332
- N. C. Soil Fertility in Relation to Soybean Growth and Production.
 To (1) determine relative importance and contributions of native soil fertility, other properties of entire root zone, and supplementary plant nutrients to growth and fruiting of soybeans; and (2) study relationships between soil and environmental conditions and crop in soybean growing areas of N. C. with special reference to factors which are limiting yields.
 Soils 118
- N. C. The Development of the Root System of Plants as Influenced by the Environment. To (1) characterize root systems of agriculturally important species and their varieties in order to determine certain aspects that may be used to differentiate their adaptation; (2) determine change in root distribution that may occur due to differences in soil properties and management practices; and (3) determine effect of any interaction that may occur within various pure and mixed plant populations.
 Soils 120
- Ohio Factors Affecting Growth and Mineral Absorption by Plants.
1. Relative Significance of Degree of Base Saturation of the Colloidal Soil Complex and the Total Quantity of Bases Present in the Soil in the Absorption of Mineral by Plants. To evaluate the relative significance of the quantity factor or total amount of the ion present, and the intensity factor, or concentration of the ion on the exchange complex, in the absorption of minerals by plants, with particular reference to calcium, magnesium and potassium.
 Agron. 1-1

- Ohio The Response of the Peach to Different Cultural Practices, and Rates of Nitrogen Fertilization as Indicated by Growth, Yield, Quality of Fruit, and Mineral Composition of the Foliage. To learn (1) systems of culture best adapted to establishment of peach orchards on old orchard sites; (2) effect of mulch upon nutritional status of tree with particular reference to fruit quality; (3) relation of nutrient content of foliage to quantity and quality of fruit produced; and (4) practicability of rapid methods of determining soluble nutrient content of leaf tissue as guide for fertilizer recommendations for peach.
Hort. 21
- Oreg. Soil Structure: Its Alteration, Influence on Plant Growth and Measurement. To (1) test under greenhouse and field conditions, certain practices and amendments to obtain effects on plant growth, yield and soil properties; (2) evaluate immediate and lasting effects of certain soil amendments on structure of different soils under laboratory conditions; and (3) improve existing methods or develop new methods of evaluating soil structure.
Soils 187 (W-30)
- S. Dak. The Influence of Aeration and Mechanical Impedance on Crop Yields. Learn physical properties of soils affecting aeration, and mechanical impedance and tolerance limits of these physical properties that influence plant growth.
Agron. 304 (NC-17)
- Tenn. Root Development of Farm Crops as Related to the Physical and Chemical Characteristics of the Soil. (1) Correlate root growth, rate of penetration and maximum depth attained, with physical and chemical characteristics of soil profile. (2) Learn top-root ratios of a given crop on different soils.
Agron. 51 Coop TVA
- Tenn. The Influence of Chemical, Physical, and Mineralogical Properties of Soils on Nutrient Availability and Plant Growth. (1) Learn chemical, physical, and mineralogical properties of profile samples from some of major agricultural soils of state and region. (2) Relate above properties to nutrient fixation and release to plants. (3) Study reaction of fertilizer materials with soils having different chemical and mineralogical properties and their relation to nutrient availability to plants.
Agron. 55 (S-14)
- Tenn. Trace Elements in Tennessee Agriculture Crops. (1) Learn which soil properties are associated with trace element deficiencies. (2) Study ways by which trace element deficiencies may be corrected. (3) Establish levels of trace elements in soils and plants associated with deficient and normal growth of several crops. (4) Relate trace element content of plants to their content of other mineral elements.
Agron. 56

- Tenn. Relationship of Soil and Other Site Factors to Forest Composition and Productivity. Relate soil type and other site factors, as aspect, topographic position and slope to: (1) dominant species of the site; growth rate and competitive position of principle tree species of the site.
For., Ames Plantation 107 Coop. TVA
- Texas Mineral Nutrition of the Cotton Plant. To (1) obtain basic information on a. role of sodium in nutrition of cotton plant, b. interactions between Na and major nutrient cations with special emphasis on Ca and K, and c. growth and development of cotton plant and changes in organic constituents as influenced by nutrient treatments; (2) study absorption, distribution, and accumulation of Mg by cotton and learn specific needs of cotton for Mg regarding amount, season, and supply of other nutrients; and (3) study influence of deficiencies and excesses of various nutrients on plant vigor, yield, and disease resistance.
Pl. Physiol., Path. 916 Coop. ARS
- Texas The Influence of Mineral Nutrition, Irrigation and Variety on the Nutrient Uptake and Metabolism of Cool and Warm Season Vegetable Crops. Learn (1) effect of various levels of macro and micro nutrients on metabolism of plants with emphasis on uptake and utilization of S and mg. (2) interaction between irrigation and mineral nutrition on cool and warm season crops, (3) differential variety response to macro and micro elements with and without supplemental irrigation.
Agron., Hort. 1044
- W. Va. The Interrelation of Soil Fertility, Planting Rate, and Geometry of Spacing in Relation to Yield of Various Hybrid Corn Varieties. To (1) determine optimum population and spacing of various corn varieties at different fertility rates: and (2) correlate effect of rate of planting and plant spacing with observed plant characteristics which include ear size, shelling percentage, stalk barrenness, lodging, and nutrient uptake.
Agron. 38

Physiological Genetics

- Ala. Some Physiological Characteristics of the Progeny of Selected Southern Pines and Their Interrelation with Nursery Practices, Survival, and Early Growth. To determine (1) certain genetic characteristics in progeny of superior, average, and inferior phenotypes through chemical studies of mineral uptake and carbohydrate food reserves; and (2) relationships between initial survival and early growth of out-planted seedlings and inherited physiological characteristics as modified by environment in the seedbed.
For. 551 (S-23)

- Calif. The Application of Quantitative Genetics to Plant Breeding Theory and Practice. To (1) study appropriate metrical character in plants in order to evaluate genetic and environmental forces governing these characters; and (2) apply results to breeding of improved varieties of crop plants.
Agron. 1562
- Ind. Nutant Genes and Exotic Germ Plasm in Corn and Their Use in the Production of Superior Hybrids. (1) Incorporate sources of genetic diversity present in the varieties of maize from Central and South America into our breeding stocks. Study (2) effects of mutant genes on plant growth with a view to finding those having some advantageous aspects for crop production, (3) biochemical agencies through which these mutant genes affect plant growth and development.
Bot. and Pl. Path. 883
- Md. Sweet Potato Breeding and Selection with Particular Reference to Quality and Resistance to Cracking. Develop varieties having resistance to cracking, incorporated with high quality of marketable roots before and after storage. Selections will be made with consideration of other characteristics required for commercial acceptability for fresh market and for processing.
Hort. Q-81-B
- Minn. Radiation as a Tool in Horticultural Crop Breeding. (1) Study mutagenic effectiveness of radiations upon several fruit and vegetable plants with respect to dosage, conditions, and time of radiation, and in relation to periods of growth, dormancy, and rest periods of plants and seeds. (2) Study effects of radiations on subsequent development of plants and seeds. (3) Produce mutations useful to fruit and vegetable breeders.
Hort. 2127 Coop. ARS
- Miss. Testing, Selecting and Breeding Collards, and a New Study of Factors Associated with the Flowering Response. To (1) test available varieties for uniformity in plant type and productivity, (2) develop uniform type adapted to home and market use. (3) study influence of photoperiod, light intensity, temperature, and growth regulators on inducing and inhibiting flowering response.
Hort. HK-18
- Okla. Exploratory Studies in Radiations and Radiochemistry in Small Grains. To (1) determine validity of use of ultra-violet light in varietal testing of small grains; (2) use radiant energy sources to aid in production of insect, disease, and low temperature resistant varieties; and (3) explore uses of radioisotopes as energy sources and as tracers in small grains research.
Bot., Pl. Path., Ent., Agron. 861 Coop. ARS

- Okla. The Physiology of Seedling Vigor and Cold Tolerance in Cotton.
 (1) Develop procedures in cooperation with plant breeders to select for cold tolerance and vigor in germinating seed, seedlings, and maturing plants. (2-5 To learn) (2) metabolic factors controlling the degree of vigor under cold conditions and how related to germination, to post seedling development, and vigor; (3) how phases of environment and nutrition affect these responses to cold; (4) effects of applied chemicals as growth regulators on cold responses; (5) by cooperating with pathologists, the relationships between seed reactivity and vigor and susceptibility or resistance to seedling disease organisms and see how use of fungicides affect such relationships.
 Agron., Pl. Path. 923 Coop. ARS
- Pa. Physiological and Nutritional Investigations of Corn and Other Crop Plants. To (1) develop tests to characterize fundamental interplant difference to aid in selection of inbreds, varieties or species for specific conditions, and in management of crops for production; and (2) evaluate inbred, varietal and species differences in nutritional and water needs.
 Agron. 1238 Coop. ARS
- Tenn. Use of Ionizing Radiations in Crop Improvement. (1) Obtain plant material with characteristics giving improved agricultural value by inducing mutations, by inducing chromosome interchanges and other aberrations, by increasing crossing over between tightly linked genes. (2) Produce monosomics in polyploids, by centromere inactivation or asymmetric interchange. (3) Study effects of altering conditions before, during, and after irradiation on genetic effects of the rays.
 Bot. 78 Coop. AEC
- Texas Inheritance of Sorghum. To (1) learn inheritance of characters in sorghum and their linkage relations as basis for further crop improvement; (2) learn nature and inheritance of certain physiological reactions in sorghum such as those to temperature and photoperiod and evaluate effect of reactions on adaptation of varieties; (3) learn role of certain physiological reactions in expression of heterosis in sorghum; (4) classify varieties and strains for genes important in choice of parents for breeding programs and for use in sorghum hybrids; and (5) make cytogenetic and genetic studies on mechanisms of sterility and relations of perennial to annual legumes.
 Agron. 498 Coop. ARS
- Texas Improvement of Bramble Fruits for Texas. Breed and test varieties of bramble fruits adapted to home and commerce. Study pathological and physiological diseases of same, with reference to sterility factor of Lawton variety, to learn causes and control methods. Study chemical weed control and methods of application with brambles.
 Hort., Pl. Physiol., Pl. Path. 1030

Effect of Pesticides

- Calif. Physiological and Pathological Problems Associated with the Consumer Packaging of Table Grapes. To determine (1) rates and amount of SO₂ diffusing into consumer package during fumigation, (2) resistance of different types of plastic films to corrosion from SO₂ under different moisture conditions, (3) bleaching effect of SO₂ on wet printed package material, (4) size and shape of consumer packages most suitable for clusters of different table grape varieties, (5) adaptation of cluster size and shape to standard sized packages by thinning before harvest, (6) relative stem brownness and dryness of consumer packaged vs. standard shipping container packed grapes, (7) precooling rates of fruit in consumer packages vs. that in standard shipping containers, (8) relative amounts of shatter, and (9) relative amounts of decay.
Viticulture 1640
- Calif. The Marketing of Deciduous Tree Fruits and Berries in Both Fresh and Processed Outlets as Influenced by So-Called Transit or Market Disorders, with Special Emphasis on the Physiological Effects of Control Treatments. To learn (1) effect of recommended control measures for pathogenic organisms on physiology of said fruits, (2) cause of post-harvest physiological disorders, (3) relationship of factors favoring development of disorders, (4) ways of preventing or reducing disorders, (5) ways to cause growers, shippers, and processors to institute ways of eliminating disorders.
Agr. Econ., Pomol., Pl. Path. 1656
- Colo. Persistence of Pesticide Residues under Mountain Climatic Conditions. Learn (1) toxic residues resulting from recommended spray programs on alfalfa, apples, pears, tomatoes, potatoes and green beans; (2) dissipation of chemical residues for the various insecticides used under field conditions. (3) Develop phases concerned with toxic residues for projects now in force, evaluate insecticides on principal orchard, potato, tomato and bean pests.
Ent. 237 (W-45)
- Fla. Effects of Biocidal Materials on the Physiology of Plants. To correlate metabolic shifts with morphological changes in plants produced as the result of the application of additives such as herbicides, fungicides and insecticides.
Bot. 728
- La. The Effect of Chemicals Used in Agriculture on the Soil Microflora. To determine effects of herbicides, pesticides, defoliant, etc., upon the microorganisms present in the soils of Louisiana.
Bot., Pl. Physiol. 837 (S-22)

- Mass. Effects of Antibiotics and Organic Fungicides, Especially the Newer, on the Survival, Rooting, and Subsequent Growth of Cuttings of Nursery Stock and of Eastern White Pine. Learn how best to use antibiotics and organic fungicides, especially new organic fungicides, for treatment of cuttings of nursery stock, i.e., trees and shrubs, and Eastern white pine, so as to increase survival and improve rooting of cuttings.
Bot. 19
- Mass. Phytotoxicity of Insecticides. To determine toxicity of certain chlorinated hydrocarbons, formulated for insecticidal use, upon growth and quality of vegetable crops grown on same plots for several years and sprayed with recommended strengths of the materials.
Chem., Hort. HF-3, HK-24 Coop. USDA
- N. J. Determination of Pesticide Residues on Raw Agricultural Commodities. (1) Learn residues of insecticides, fungicides, and herbicides on and in forages, fruit, vegetables, and milk, following application of pesticides. (2) Improve current analytical methods and develop new ones for learning pesticide residues on and in raw agricultural commodities.
Agr. Chem. 102 (NE-36)

REGIONAL PROJECTS

- NC-46 Soil Moisture Storage and the Use of Water by Agronomic Crops. a. To determine the factors affecting the time and volume pattern of soil moisture use by agronomic crops. b. To develop quantitative methods to measure the water stress in plants. c. To determine field evapo-transpiration rates and relate them to meteorological factors.

Cooperating station: Nebr. I-D

- W-39 Effects of Fluorine (as fluorides) on Plants, Animals, and Soils. 1. To conduct research on the effects (assimilation, physiological reactions, and other metabolic processes) of different levels of fluorides in specified plants and animals. 2. To investigate the accumulation of fluorides in soils, their reaction in the soil and their effect upon plants. 3. To develop and/or evaluate simplified or other methods for determination of atmospheric fluorides. 4. To develop techniques for the alleviation of fluoride injury in plants and animals.

Cooperating stations: Utah I-A and G; Calif., Idaho, Wash. I-I

The following regional projects in related fields may be found in other parts of the "Compilation of Research Summaries" as indicated.

- NC-10 Eradication or Control of Weeds and Other Undesirable Plants.
Part 24
- NC-17 The Role of Organic Matter and Related Soil and Crop Management Practices in Improving Soil Structure and Other Factors Affecting Productivity.
Part 21, Section a, b, c.
- NC-25 Factors Affecting the Utilization of Feed by Ruminants.
Part 4, Section a, b.
- NCM-23 Facilitating the Marketing of Seed Through Improved Testing and Handling Procedures.
Part 8, Section a.
- NE-11 Soil Structure Problems in Northeastern Agriculture.
Part 21, Section c.
- NE-22 Soil-Plant-Water Relationships as a Basis for Irrigation.
Part 3, Section a.
- NE-25 Biology and Control of Wilt Pathogens.
Part 11
- NE-36 Pesticide Residues in or on Raw Agricultural Commodities.
Part 7, Section d.
- S-9 The Introduction, Multiplication, and Evaluation of New Plants for Industrial and Agricultural Use and the Preservation of Valuable Germ Plasm.
Part 12
- S-12 Production and Evaluation of Forage Crops and Pastures in the South.
Part 10
- S-14 The Influence of Chemical, Physical, and Mineralogical Properties of Soils on Their Structure and on Plant Growth.
Part 21, Section a.
- S-22 Pesticide Residues - Determinations; Sampling; Effects on Plants and Soils.
Part 7, Section d.
- S-23 The Application of Genetics and Cytology to the Improvement of Southern Pines.
Part 11

- W-25 Ecology and Improvement of Brush Infested Range Lands.
Part 10
- W-29 Soil-Water-Plant Relationships Under Irrigation.
Part 21, Section c.
- W-30 Measurement, Evaluation, and Modification of Soil Structure.
Part 21, Section c.
- W-45 Pesticide Residues: Their Nature and Determination in Relation
to the Production and Marketability of Agricultural Products.
Part 7, Section d.
- W-47 Developmental Aspects of Root Growth in Forage Plants.
Part 10
- W-58 Factors Affecting Seed and Vegetative Reproduction in Forage
Crops.
Part 10



LIST OF COMPILATIONS OF FEDERAL-GRANT RESEARCH PROJECTS
AT STATE AGRICULTURAL EXPERIMENT STATIONS

ARS-23-8:		
Part :	Subject-Matter Area	Title of Section
Numbers :		
1	Agricultural Chemistry	Agricultural Chemistry
2	Agricultural Economics	<ul style="list-style-type: none"> a. Prices, Incomes, & General Studies of Commodities & Industries b. Farm Management c. Land Economics d. Farm Finance & Taxation
3	Agricultural Engineering	<ul style="list-style-type: none"> a. Land & Water Use & Development b. Power Machinery & Equipment c. Farm Structures & Materials
4	Animal Husbandry	<ul style="list-style-type: none"> a. Beef Cattle b. Sheep & Goats c. Swine
5	Dairy Husbandry	Dairy Cattle
6	Dairy Technology	Dairy Technology
7	Entomology & Economic Zoology	<ul style="list-style-type: none"> a. Field Crop Insects b. Fruit, Nut & Vegetable Insects c. Miscellaneous Insects & Economic Zoology d. Insecticides
8	Field Crops	<ul style="list-style-type: none"> a. Cereal Crops b. Oil, Fiber, Tobacco & Sugar Crops
9	Food Science & Technology	<ul style="list-style-type: none"> a. Food Chemistry, Microbiology, Sanitation & Public Health b. Food Engineering, Processing, Product and Process Development, Utilization and Waste Disposal c. Food Quality & Standards, Acceptance, Preference, & Marketing
10	Forage Crops, Pastures & Ranges	Forage Crops, Pastures & Ranges
11	Forestry	Forestry

ARS-23-8:

Part : Subject-Matter Area : Title of Section
Numbers :

12	Fruits & Nuts	Fruits & Nuts
13	Home Economics	a. Human Nutrition b. Housing c. Clothing & Textiles d. Foods-Consumer Quality & Utilization e. Household Economics & Management
14	Economics of Marketing	a. Field Crops b. Fruits & Vegetables c. Livestock, Meats & Wool d. Dairy Products e. Poultry & Poultry Products f. Forest Products & Ornamental & Drug Plants g. Cross-Commodity & Functional Studies
15	Meteorology	Meteorology
16	Ornamental & Drug Plants	Ornamental & Drug Plants
17	Plant Pathology & Bacteriology	a. Plant Pathology, Botany, & Diseases of Miscellaneous Crops b. Diseases of Field Crops c. Diseases of Fruit Crops d. Diseases of Vegetable Crops
18	Plant Physiology & Nutrition	Plant Physiology & Nutrition
19	Poultry Industry	Poultry Industry
20	Rural Sociology	Rural Life Studies
21	Soils	a. Soil Chemistry & Microbiology b. Soil Fertility, Management & Soil-Plant Relationships c. Soil Physical Properties, Conservation & Classification
22	Vegetables	a. Vegetable Crops b. Potatoes
23	Veterinary Science	Veterinary Science
24	Weeds	Weed Control

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