environmental farm plan
sustainably farmed

INFOSHEET #20

PEST MANAGEMENT

How to address concerns identified in Environmental Farm Plan Worksheet #20

Based on Environmental Farm Plan Workbook, 5th ed. 2025

This infosheet outlines options to address concerns identified in your Environmental Farm Plan (EFP) as they relate to pest management.

For pest management activities that are located in a Source Water Protection Zone, the risk management measures needed to address the risk will be determined through the Source Water Protection process in your particular area. The measures may be the same as or more than required by EFP due to the proximity to a municipal drinking water supply. For more information, contact your local municipality or check their website under Source Water Protection Planning.

For help with technical terms, please see the full glossary in your EFP Workbook.

All options in this infosheet are classed as **Actions** or **Compensating Factors**.

- **Actions** address the identified concern, and will change the EFP rating to (3) or (4) Best.
- **Compensating Factors** are alternatives that will adequately address the concern, but will not change the rating in the EFP worksheet.

In most cases, you'll need more information before choosing and implementing options. Sources for more information are noted at the end of this infosheet.

Sustainable Canadian Agricultural Partnership
OSCIA
Ontario
Canada

PEST MANAGEMENT

20-1. Management skills

BACKGROUND

Keeping informed about the latest advances in pest management can help you reduce costs and time, improve yield, and lower environmental risk.

New application methods and technological developments can mean more effective use of a pesticide, so that less product, fuel and labour are needed to get the same or better protection and production results.

New types of pesticides may have less environmental risk or be more effective so that less is needed to get the same or better results.

Other Integrated Pest Management (IPM) strategies including cultural, physical and biological management can help control pests, lower input costs and environmental impacts, and contribute to soil health and productivity.

WHAT CAN YOU DO?

OPTION 1 – ACTION

Attend information meetings at least once a year or update yourself on new crop or animal protection methods:

- look for meetings by agricultural groups, agri-environmental groups, and crop protection companies
- seek out information – online, commodity groups, and in farm media

OPTION 2 – ACTION

- employ sustainable practices, biopesticides and improved application methods for better pest management
- attend information meetings at least twice a year or update yourself on new crop or animal protection methods, and apply new knowledge

Constant advances in technology offer opportunities for production gains, input savings, and environmental benefits.

20-2. Pesticide training

BACKGROUND

Any person handling pesticides must be certified or trained. The Ontario Pesticide Education Program (OPEP) offers the Grower Pesticide Safety Course where a producer can become a Certified Farmer, allowing them to purchase and use Class B (Restricted) or Class C (Commercial) pesticides. OPEP also offers Farmer Assistant training for any farmer, farm employee, family member, or seasonal worker to work under the supervision of a Certified Farmer to mix, load or apply these pesticides.

The Grower Pesticide Safety Course is offered online.

WHAT CAN YOU DO?

OPTION 1 – ACTION

Have at least one person on the farm take the Grower Pesticide Safety course to become a Certified Farmer so they can handle pesticides and supervise other staff.

OPTION 2 – ACTION

Have other family members or employees that handle pesticides on the farm take either the Grower Pesticide Safety course or the Farmer Assistant training course to work under a Certified farmer.

OPTION 3 – ACTION

Have pesticides applied by a Custom Applicator.

20-3. Crop rotation used

BACKGROUND

Crop rotation is an effective strategy in pest management, offering many benefits. Done correctly, it reduces pest habitat and pest food sources, lowers the risk of plant disease, increases yields, and improves soil health.

Choosing the right crops for rotations is important. Include:

- crops that can successfully compete with weeds, with those that cannot
- crops that require different types of herbicides, with those that need little or no herbicides

The longer the rotation, the shorter the opportunity for pests to become established.

WHAT CAN YOU DO?

OPTION 1 – ACTION

Use a minimum three-crop rotation that includes cereals (no legumes underseeded):

- a three-crop rotation provides less opportunity for pests to become established, since the pest cycle is broken by planting a non-susceptible crop into the residue of the host crop

OPTION 2 – ACTION

Use a minimum three-crop rotation that includes legumes underseeded into cereals:

- this will establish a better soil structure, organic matter, and nitrogen supply

Including a legume crop in the rotation will improve soil structure, organic matter, and nitrogen supply.

Scout fields regularly for weeds, insects and disease. This can be greatly facilitated by technology, but it's always best to verify. By monitoring the pest situation on your land, you can make an informed decision as to whether pest control is needed.

20-4. Pest monitoring (including weeds)

BACKGROUND

It is important to continuously monitor your crops for pests so that you know as soon as possible when a pest problem occurs. Through careful monitoring, the kind of pest, the number of pests, and the extent of pest damage can be discovered.

Monitoring can be done with visual checks (on a representative plant or area of field), traps (lure pests into a container), and sweep nets (for foliar insects that can be dislodged).

WHAT CAN YOU DO?

OPTION 1 – ACTION

Monitor crops for pests during EACH stage of crop development:

- fruit set
- flowering
- early development

Adjust controls and treatments based on pest levels.

OPTION 2 – ACTION

Monitor crops for pests during critical periods of crop development:

- fruit set
- flowering
- early development

Implement control measures ONLY when the pest population is large enough and reaches an action threshold.

For an introduction to the basics of integrated pest management (IPM), Crop IPM covers pest monitoring, thresholds, control options (crop, biological and agronomic), and pesticide timing and application.

20-5. Biosecurity

BACKGROUND

Pest outbreaks affect not only the profitability of an individual business but can potentially close borders to trade and result in serious economic hardship to entire industries – as well as the rural communities they support.

Protecting the agricultural plant resource base from pests (insects, mites, plant pathogens, and weeds) strengthens the sustainability of Ontario's agricultural sector, and helps it meet current and future market demands.

WHAT CAN YOU DO?

OPTION 1 – ACTION

Complete a Farm Biosecurity Self-Assessment:

- share ideas and experiences with peers and develop a strategy with BMPs to improve on-farm biosecurity in an effective and practical way

OPTION 2 – ACTION

Put in place a biosecurity program that meets national biosecurity standards:

- use BMPs to prevent, minimize or control the introduction, spread and release of plant pathogens, arthropods (insects and mites), weeds or other pests on the farm

A biosecurity plan will reduce the risk of a disease or plant pest outbreak.

20-6. Methods of control

BACKGROUND

Many pest control options are available. Using a variety of pest management methods slows the development of pest resistance compared to reliance on a single management method, which reduces selection pressure.

Use low-risk methods of pest control when possible.

Pollinators and natural enemies are vital to crop production and the environment. Some insecticides used to protect crops from insect pests are toxic to pollinators and natural enemies. Producers need to implement BMPs, including IPM practices, and meet all requirements pertaining to the use of Insecticide-treated seed. Read about the importance of protecting bees and other pollinators, and the actions you can take to help.

OMAFA offers comprehensive field, crop and horticulture production information found in agronomy guides and the Crop Protection Hub.

WHAT CAN YOU DO?

OPTION 1 – ACTION

Assess and integrate all options for reducing pest populations and damage. Where feasible, use conventional pesticides as a last resort. Where pesticides are used, implement BMPs to reduce impact on the environment.

Options, strategies and considerations include:

- **Resistant or tolerant cultivars** – select cultivars less susceptible to pest pressure
- **Crop rotation** – some pests over-winter in crop refuse, meaning rotating to a non-related crop where possible may help to break the pest cycle
- **Certified planting/nursery stock** – use disease-free or virus-free plants to reduce the likelihood of losses
- **Sanitation** – remove all sources of infection (e.g., cull piles and dropped fruit) from the field or orchard
- **Elimination of alternative hosts** – weeds and wild fruit trees, grapevines and brambles often act as alternative hosts – maintain good weed control and eliminate wild hosts from the perimeter of the planting
- **Inter-cropping** – avoid inter-cropping plants with similar pest complexes, as non-related crops planted in close proximity can act as a barrier to insects and pathogens
- **Habitat modification** – plant cover crops to promote beneficial organisms
- **Pruning and training** – prune and remove infected plants to reduce pest pressure – pruning and training plants also improves air movement within the canopy, and will improve spray coverage
- **Water management** – avoid planting in poorly drained locations, and use timely irrigation if needed to reduce plant stress during drought and increase tolerance to pests
- **Nutrient management and plant health** – manage nutrients to avoid excessively lush terminal growth, which attracts some pests
- **Physical removal** – remove weeds by cultivation, hand-weeding, or smothering with mulch trap crops (crops are used to lure pests away from primary crops)
- **Biological control** – use pest's natural enemies to help suppress pest populations
- **Pesticides (conventional pesticides and biopesticides)** – weigh effects such as residue, toxicity, effects on non-target crops, pollinators, natural enemies, and other animals, and choose options that will have the least effect on the environment while still managing pest problems effectively

20-7. Resistance management

BACKGROUND

Pests are resistant when they survive exposure to pesticides at rates that previously controlled them. Generally, resistance to a pesticide develops after repeated exposure to a specific chemical.

Resistance occurs because a few naturally occurring resistant individuals survive after each spray, while the susceptible portion of the population is killed. These resistant survivors multiply and gradually replace the susceptible ones. Eventually the resistant population dominates, and the pesticide loses its effectiveness.

Base pesticide application decisions on scouting, and monitoring for signs of pest resistance or damage. Sprays applied to control one pest can affect the status of resistance of other pests within the complex.

Management programs for pesticide resistance, host variety (genetic) resistance, and pest resistance emphasize an integrated approach that stresses prevention and avoids the overuse of a single strategy, product (chemical family or genetic resistance source) or technology.

All management strategies are susceptible to resistance. Without an integrated resistance management program, resistance problems are more likely to develop.

Scouting is a critical component of a resistance management strategy. Here, leafhoppers are being scouted in a lettuce field.

WHAT CAN YOU DO?

OPTION 1 – ACTION

Use IPM measures:

- rotate crops and use common refugia (where appropriate)
- apply pesticides at recommended rates as part of an IPM program (only when necessary)
- monitor weather conditions
- record information to assist with future variety selection

OPTION 2 – ACTION

Use IPM measures, implement insect, weed and disease resistance management programs, and rotate different crops and resistant genes:

- apply pesticides when pests are most vulnerable (requires scouting, identification and understanding pest life cycles)
- optimize sprayer settings to match crop and environmental conditions
- tank-mix pesticides with multiple modes of action (when permitted by pesticide label) and rotate pesticides with different modes (sites) of action from year to year
- rotate crops with different pest spectrums
- integrate other IPM strategies
- implement an insect resistance management (IRM) plan to reduce the risk of insect resistance and maintain the sustainability of transgenic technologies
- implement a weed resistance management plan to reduce the risk of weed resistance and maintain the sustainability of transgenic technologies
- rotate varieties with alternative sources of resistance
- monitor resistant or tolerant varieties for damage and determine if resistance is developing
- record information to assist with future variety selection

20–8. Record-keeping

BACKGROUND

By keeping detailed records of pest control methods, monitoring reports, weather conditions, cropping practices, and yield data, you will have the information to understand what happened and how to improve things for the future.

Records can help you to evaluate your results, plan pest control strategies for the future, and document costs of various control measures.

WHAT CAN YOU DO?

OPTION 1 – ACTION

Keep records for all pesticides used, with information on:

- date of application
- type of chemical
- application rates
- target pest
- weather conditions

OPTION 2 – ACTION

Keep records for all pesticides used, including all of the information in Option 1 plus:

- stage of crop and pest development
- chemical family/grouping number of pesticides

Use farm management software to keep records.

20–9. Applicator equipment calibration and maintenance

BACKGROUND

If application equipment in not calibrated properly, problems can occur. Uneven or inconsistent application rates can miss a significant number of pests in your field, leave excessive residue levels on food products, and deposit too much product on sensitive crops.

With proper calibration, verify the equipment is functioning properly, ensure you are applying the recommended dosage, and accurately predict the total volume of material to apply and total application time for a given area.

WHAT CAN YOU DO?

OPTION 1 – ACTION

Service and calibrate all application equipment before the start of each crop season, and rinse and recalibrate the sprayer between application of different pesticides:

- repeat calibration at least once during the growing season
- keep records of calibration details

Service and calibrate all application equipment before the start of each crop season.

20-10. Pesticide drift control and pattern uniformity

BACKGROUND

Drift is the airborne movement and deposition of particles or droplets outside the target area. There are several types of drift.

Physical drift: Coarser droplets move laterally over short distances, falling close to the point of release. Finer droplets or particles can remain suspended for longer periods, increasing the distance they move from the point of discharge.

Vapour drift: Primarily due to product formulation, this is the movement of pesticide vapours generated by volatilization or evaporation, and moved by wind to non-target areas. Vapour drift can occur at the time of application or following deposition on plant or soil surfaces and has the potential to travel significantly farther than the physical drift.

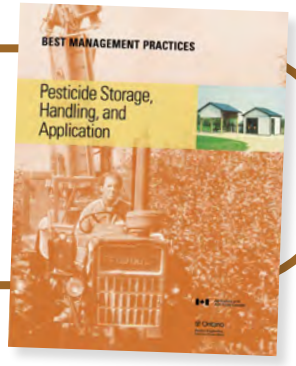
Fugitive drift: The movement of dust containing seed treatment particles (to control certain insect pests) which vacuum planter exhausts during corn and soybean planting. This drift can land on non-target foraging sources of pollinators.

The factors causing drift can be complex, involving environmental conditions and spray practices. The environmental conditions of greatest importance are wind direction and velocity, air turbulence, relative humidity, barometric pressure, and air temperature.

In general, equipment that produces a coarser spray quality has less drift potential. Droplet size may be a requirement on some pesticide labels and can be changed by nozzle choice and operating pressure.

The most important spray practices involve the size of spray nozzles, the height of spray release above the target or canopy, and the operating pressure. Once released, spray droplets begin to evaporate, increasing the time they are exposed to outside forces that may carry them off course.

This BMP publication provides an overview of safe, practical and effective on-farm pesticide management. Issues and options for storage structures, handling techniques, transportation, mixing and loading, spills management, spraying calibration, and maintenance are presented.



WHAT CAN YOU DO?

OPTION 1 – ACTION

Select equipment and techniques to maximize coverage and minimize drift:

- select appropriate nozzle types to maximize spray coverage and minimize spray drift
- reduce the distance between the nozzle and the target when spraying
- always keep nozzles and equipment free flowing and check nozzles frequently for wear and blockage
- clean or replace nozzles when required
- choose and adjust spray equipment (air blast, boom type, boomless type) to produce a minimum of fine droplets
- become familiar with the pesticide product's toxicity, volatility and formulation, and how these influence the product's drift potential – the same pesticide may be available in other formulations that are less volatile after application
- consult pesticide label for application conditions. If the label is silent on optimal weather conditions, spray only when:
  - wind speed is between 3 and 10 km/h and the direction is steady and moving away from sensitive areas
  - temperatures are low, and humidity is high
- don't spray when there is a temperature inversion – for information on determining if there is an inversion review **Thermal Inversions for Sprayer Operators**.
- use the required seed lubricant and planter deflectors and follow the recommended best management practices to minimize pollinator exposure to insecticide-contaminated dust

Review this OMAFA factsheet:

Pesticide drift from ground applications

20–11. Spray application accuracy

BACKGROUND

Proper placement of spray will:

- reduce the potential for the development of pest resistance
- improve spray uniformity, which increases effectiveness and reduces the potential for off-target contamination
- reduce volume and cost of pesticide product needed

WHAT CAN YOU DO?

OPTION 1 – ACTION

Apply the pesticide using a proper and accurate method to ensure continuous spray coverage without excess overlaps for ALL spray applications.

This is achieved by doing the following:

- use a mechanical means of row guidance (e.g., tram lines, foam markers, or GPS with autosteer)
- fix boom height to maximize coverage uniformity and minimize drift even if slower travel speeds are required
- control sprayer sections automatically to prevent overlaps
- use pressure-based flow regulation

OPTION 2 – ACTION

Apply the pesticide using a proper and accurate method to ensure continuous spray coverage without excess overlaps for ALL spray applications.

This is achieved by doing the following:

- use a mechanical means of row guidance (e.g., GPS with autosteer)
- use automatic boom height adjustment to maximize coverage uniformity and minimize drift even if slower travel speeds are required
- use nozzle-resolution sectional control to prevent overlaps
- use pulse width modulation flow regulation
- use turn compensation

While some may still use foam markers to prevent spray over-and underlaps, GPS technology and autosteer working in tandem with sectional or individual nozzle control achieves much greater accuracy.

20-12. Protective clothing and personal protective equipment

BACKGROUND

Pesticides can be extremely hazardous to humans if they are not handled properly. Safety precautions to take during pesticide handling include wearing clean clothing, a respirator, chemical-resistant gloves with cuffs turned back, chemical-resistant apron, safety goggles, waterproof boots, and a face shield or mask.

It is important to wear protective clothing not only when handling pesticides directly, but also when handling materials contaminated with pesticides. Gloves are the last item of protective clothing removed and they should be rinsed before they are taken off to prevent exposure to pesticides.

Inspect protective clothing regularly for holes and tears and replace them as soon as possible if holes are detected.

When handling pesticides, always wear the proper safety equipment.

WHAT CAN YOU DO?

OPTION 1 – ACTION

Always check the pesticide label for safety precautions, and use protective clothing and personal safety equipment as prescribed:

- read and abide by all precautions for each pesticide before use – products have varying toxicity, so it is important that appropriate product-specific safety measures are taken during handling, application and cleanup
- wear protective clothing, including clean clothing, chemical-resistant gloves and apron, and waterproof boots
- wear safety equipment, including a respirator, safety goggles, and face shield

OPTION 2 – ACTION

Always check the pesticide label for safety precautions, use protective clothing and personal safety equipment as prescribed, and clean and properly maintain all protective clothing and safety equipment:

- test respirator and replace cartridge when needed
- inspect clothing for holes and tears and replace when necessary
- wear gloves when cleaning clothing and equipment to prevent exposure

20-13. Weather conditions (spraying for pest control)

BACKGROUND

Do not apply pesticides when heavy rains are expected because they can easily wash off and contaminate surface and groundwater supplies. Other weather-related factors such as temperature can affect the breakdown of pesticides.

Only apply pesticides when wind speed is between 3 and 10 km/h (consult pesticide label for specific restrictions) and the direction is steady and moving away from sensitive areas.

WHAT CAN YOU DO?

OPTION 1 – ACTION

Base spraying plans on 24-hour forecasts for rain and wind. Stop spray operations if rain begins or wind speeds increase to greater than 10 km/h.

OPTION 2 – ACTION

Do not spray if forecasted winds are greater than 10 km/hr.

Do not spray when heavy rain is expected within 24 hours:

- heavy rains may reduce pesticide effectiveness and wash it into nearby surface water

Do not spray if winds are greater than 10 km/hr, and do not spray when heavy rain is expected within 24 hours

20-14. Separation distance of pesticide application from surface water

BACKGROUND

It is important that a minimum separation distance is kept between pesticide application area and any surface water. Generally, the risk of contamination from spray drift or runoff decreases as the separation distance increases. Increases in runoff volume are associated with increasing slope steepness, lower soil infiltration rates (e.g., clay soils), antecedent moisture conditions (e.g., soils with higher existing moisture) and increased intensity of precipitation events.

Label instructions reflect all the known properties of the product. Follow the directions carefully to minimize risks to people, livestock, wildlife and water.

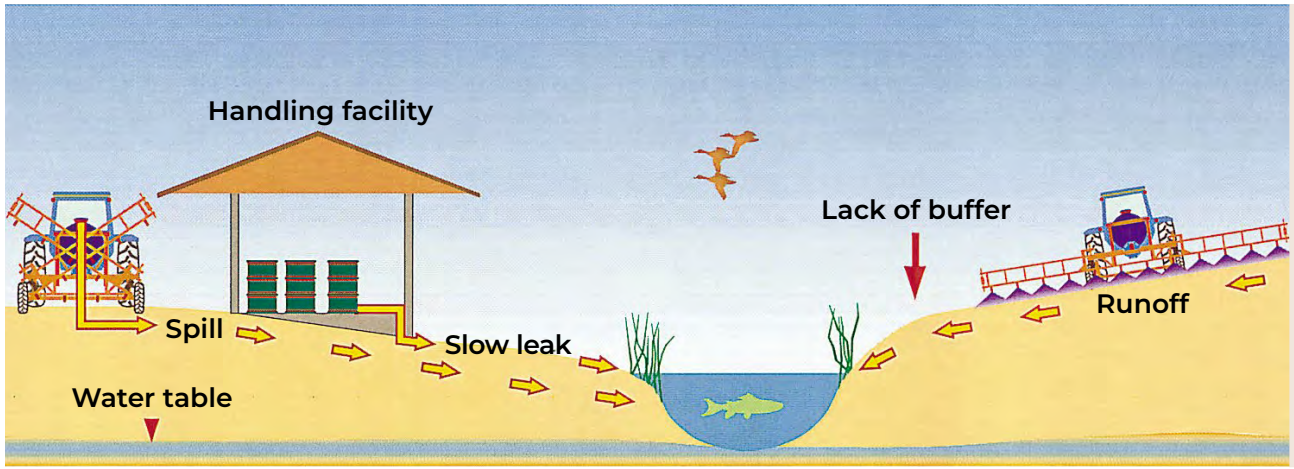
WHAT CAN YOU DO?

OPTION 1 – ACTION

Spray more than 15 m (50 ft.) from surface water/sensitive areas or at the separation distance stated on the product label.

OPTION 2 – ACTION

Spray more than 15 m (50 ft.) from surface water/sensitive areas or at the separation distance stated on the product, whichever is greater.



Surface waters can be contaminated by pesticides through leakage, spills, and surface runoff.

20-15. Separation distance of pesticide application from well

BACKGROUND

The potential for your well water to become contaminated decreases as the distance between the well and source of contamination increases.

Soil type determines whether additional attention and water testing are needed. Finer-textured soils slow water movement, allowing more opportunity for filtering and cleaning. Coarser-textured soils result in a higher probability of a water well becoming contaminated. Since bedrock is often fractured, exposed bedrock or shallow soil depths over bedrock/water table offer very little or no protection.

WHAT CAN YOU DO?

OPTION 1 – ACTION

Spray pesticides more than 24 m (76 ft.) from a drilled well and more than 47 m (151 ft.) from a bored/dug well. These distances reduce the potential for runoff or drift to reach water wells.

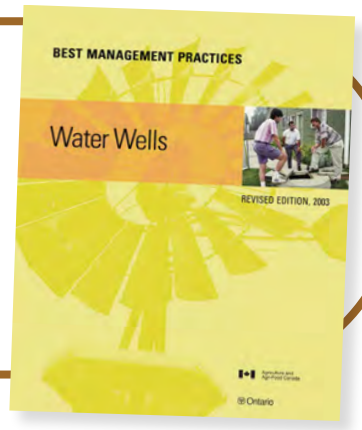
OPTION 2 – ACTION

Spray pesticides more than 90 m (300 ft.) from any private well.

Spray pesticides more than 100 m (330 ft.) from a municipal well.

Maintain a minimum separation distance between pesticide applications and any well.

The Water Wells BMP book can help you protect your well water quality. It describes all facets of common well types: components, maintenance, new well construction requirements, and procedures for unused wells. It also explains risk factors for water quality, and measures to mitigate them.



Read this OMAFA factsheet:

Pesticide Contamination of Farm Water Sources

FOR MORE INFORMATION

ONTARIO MINISTRY OF AGRICULTURE, FOOD AND AGRIBUSINESS (OMAFA)

- Agricultural Information Contact Centre (AICC)
  Toll free: 1-877-424-1300 | e-mail: ag.info.omafa@ontario.ca

  Find most of the resources listed below at www.ontario.ca

Publications

- Agronomy Guide for Field Crops, Publication 811
- Vegetable Crop Protection Guide 2020-2021, Publication 838
- Guide to Vegetable Production in Ontario, Publication 839
- Guide to Nursery and Landscape Plant Production and Integrated Pest Management, Publication 841

Factsheets

- Pesticide drift from ground applications
- Pesticide contamination of farm water sources

Best Management Practices Series

- Buffer Strips
- Field Crop Production
- Integrated Pest Management
- Irrigation Management
- Pesticide Storage, Handling, and Application
- Water Wells

OTHER OMAFA RESOURCES

- Ontario Crop IPM
- Ontario Crop Protection Hub
- Field Crop News

AGRICULTURE AND AGRI-FOOD CANADA

- Integrated Pest Management
- Crop Biosecurity

HEALTH CANADA

- Pollinator Protection and Responsible Use of Insecticide Treated Seed

UNIVERSITY OF GUELPH, RIDGETOWN CAMPUS

- Toll-free: 1-800-652-8573
- Ontario Pesticide Education Program (OPEP)

OTHER RESOURCES

- Sprayers 101
- Canadian Corn Pest Coalition

LEGISLATION/ACTS

- Pesticide Act, 1990
- Ontario Regulation 63/09
- Ontario Water Resources Act, 1990