Crop Diversity Aids Weed Management

Review of Principles

Weed – Crop Associations

Weeds Tend to Associate with a Crop that Has Similar Growth Habits.

Example – Wild Oats and Spring Wheat

Weed – Crop Associations

Why ?

- Weeds Are Adapted to a Growing Season (Cool or Warm Season).
- If Crop Matches Weed, More Weed Seed is Produced.

Population Growth of Weeds

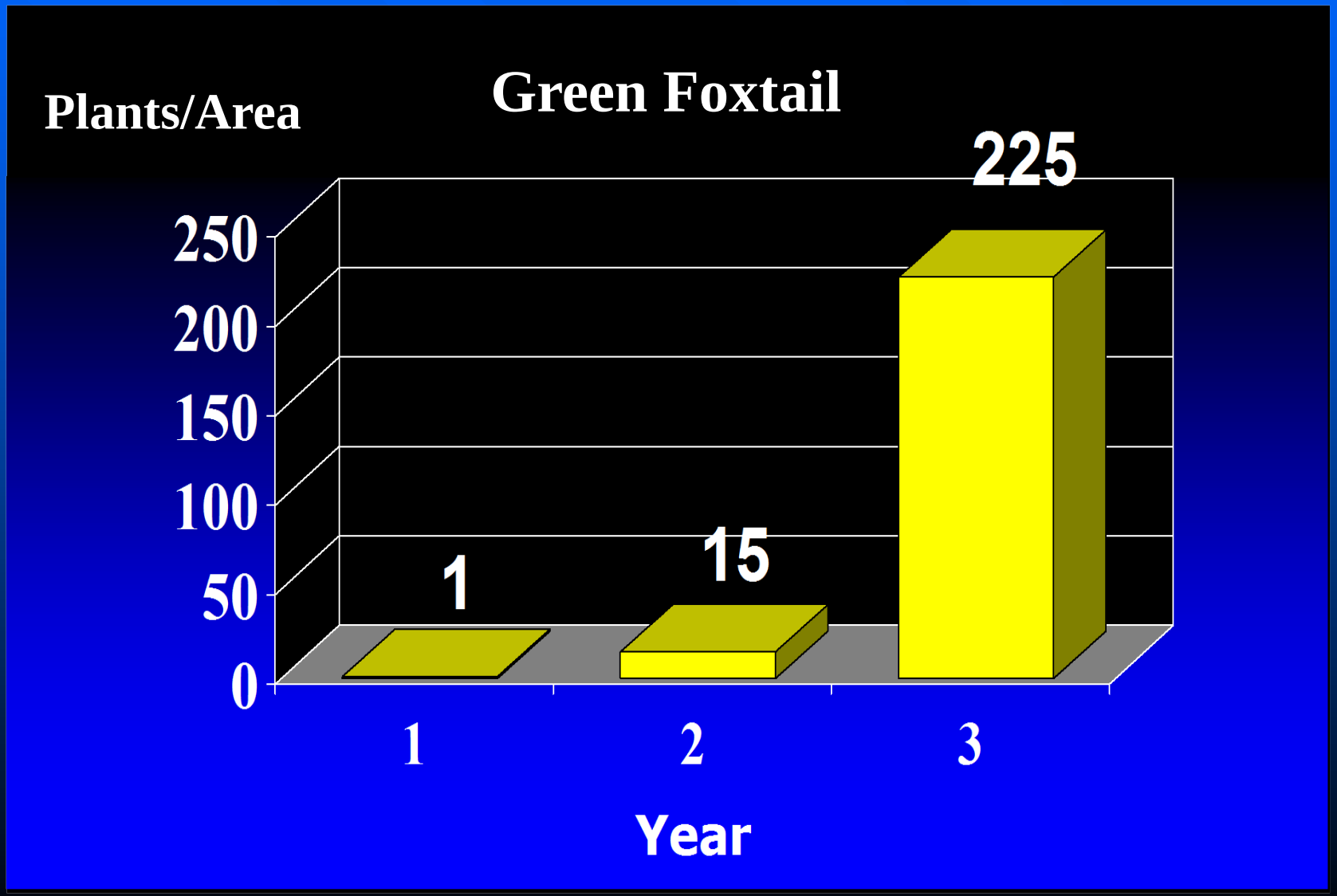
Weed Densities Can Increase Rapidly

Example – Green Foxtail in Corn

1. One Plant Produces 2500 seeds
2. 6% of Seed in Soil Emerges Each Year
3. Control Level in Crop – 90%

This will increase densities 15 fold/yr

Rate of Increase (15 fold/yr)



Foundation of Integrated Weed Management

Reduce Number of Weeds in System

1) Weed Seed Densities in Soil

2) Weed Seeds Produced In-Crop

Weed Seeds in Soil

Weed Seeds Can Either:

Germinate, or

Die Naturally, or

Are Consumed by Microorganisms

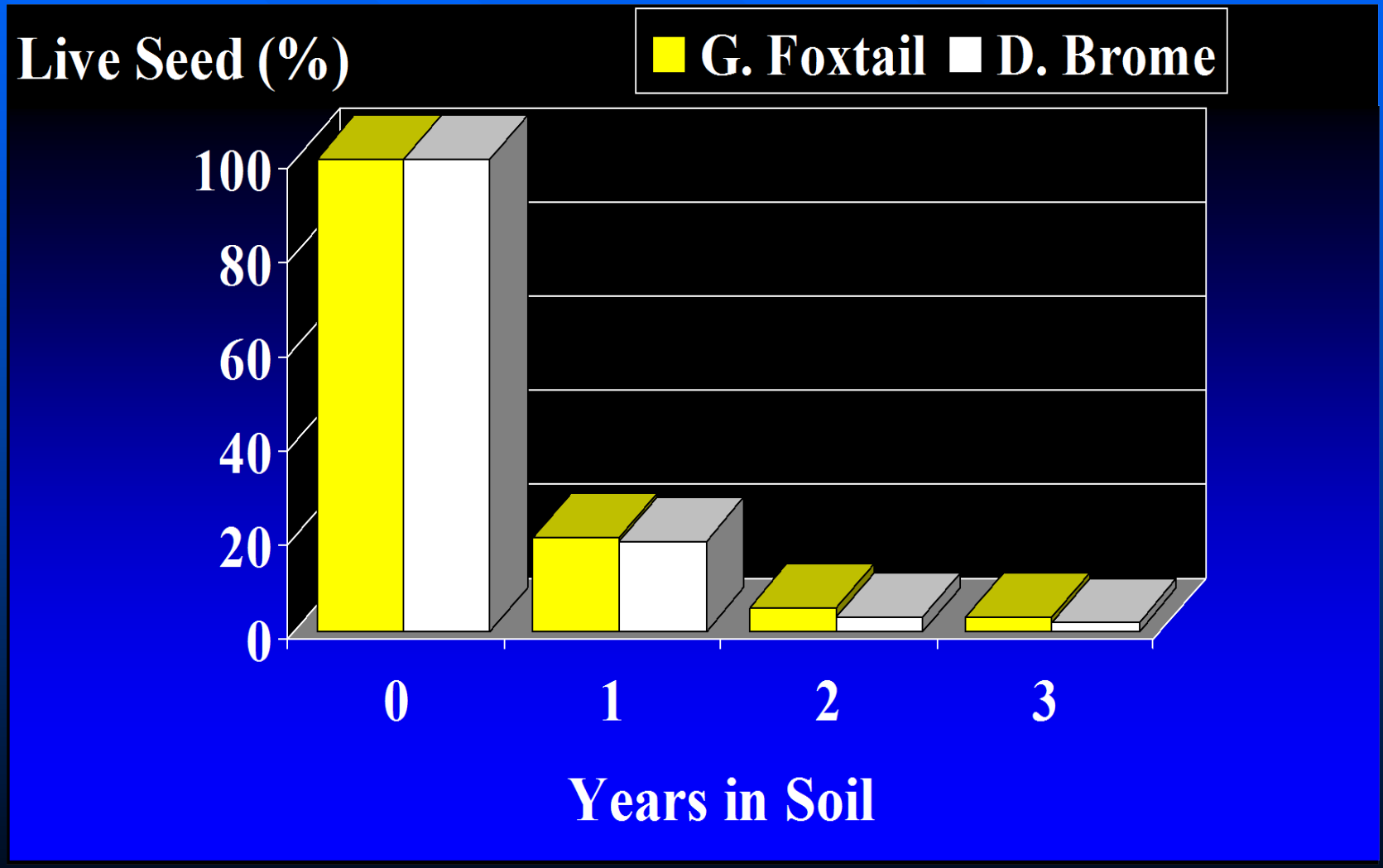
Weed Seeds in Soil

Weed Species Numbers in Soil

Decrease Rapidly over Time

If New Seed is not Added

Weed Seed Survival in Soil



Weed Seeds in Soil

2-Year Interval Without Adding Weed Seed Reduces Weed Density in Soil > *90%*

Preventing Weed Seed Production

Key Growth Periods

Emergence and Flowering

Eliminating One of These Periods

(*With Crop Diversity*)

Prevents

Crop Diversity Helps Manage Weed Growth

Example – Central Great Plains

Producers Can Control Broadleaf Weeds in Proso Millet, but not Foxtails and Sandbur

Crop Diversity and Weed Growth

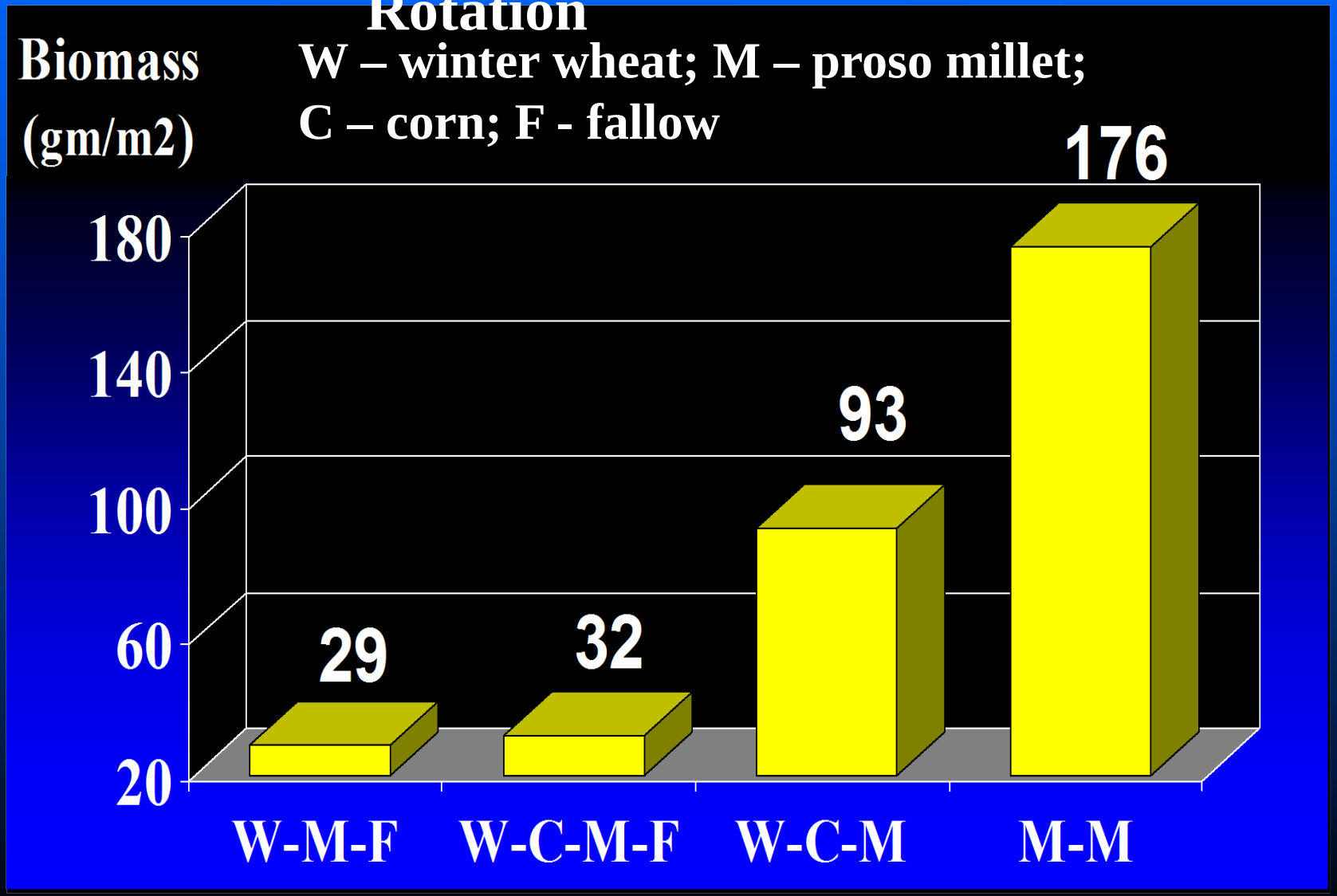
By Rotating Winter + Summer Crops,

Producers Can Reduce Biomass of

Foxtail and Sandbur

6–Fold **in Proso**

Grassy Weeds in Proso Millet



Weeds in Proso Millet

The 2 Years out of Proso in W-M-F

1. Favors Seed Bank Decline

2. Also, Prevents Seed Production of

Foxtails and Sandburs in W and F

Thus, Less Grassy Weeds in Proso

Weeds in Proso Millet

Also, Note that Weed Biomass in

W-C-M-F is 1/3 of W-C-M

Foxtail and Sandbur is Easily Controlled in

Winter Wheat and Fallow, thus

Weed Density in Soil Declines

Crop Diversity

Rotating Cool + Warm Season Crops Also

Helps Manage Weeds

Spring Wheat - Dry Bean

Weed Density is 30% less than in a Dry Bean – Dry Bean sequence

Crop Sequence - Weeds

Some Sequences have Higher Risk of More Weeds

Reflects Similarities in Growing Season and Planting Date

* - Low Risk *** - High Risk

Risk of Crop Sequence for More Weeds

* Low Risk *** High Risk

	Barley	Canola	Crambe	Dry Bean	Dry Pea	Flax	Safflower	Soybean	Sunflower	Wheat
Barley	***	**	**	*	**	**	**	*	*	***
Canola	**	***	***	**	***	***	***	**	**	**
Crambe	**	***	***	**	***	***	***	**	**	**
Dry Beans	*	**	**	***	**	**	**	***	***	*
Dry Pea	**	***	***	**	***	***	**	**	**	**
Flax	**	***	***	**	***	***	***	**	**	**
Safflower	**	***	***	**	***	***	***	**	**	**
Soybean	*	**	**	***	**	**	**	***	***	*
Sunflower	*	**	**	***	**	**	***	***	***	*
Wheat	***	**	**	*	**	**	**	*	*	***

***Crop Diversity* Can Help Manage Weeds**

Integrated Weed Management

(Multiple Tactics)

Narrow Rows

N Placement

Delayed Planting

Higher Seeding Rate

Herbicides

General References

Anderson, R. L., K. L. Bailey, and F. B. Peairs. 2002.Guidelines for integrating ecological principles of pest management with rotation design. In Dryland Agriculture. American Society of Agronomy Monograph Series No. 23 (Revised).

Pedigo, L. 1995. Closing the gap between IPM theory and practice. J. Agric. Entomology 2:171-181.