Supreme Court of Texas

No. 20-0881

Helena Chemical Company,
Petitioner,

v.

Robert Cox, et al.,
Respondents

On Petition for Review from the
Court of Appeals for the Eleventh District of Texas

Argued October 26, 2022

JUSTICE BLACKLOCK delivered the opinion of the Court.

JUSTICE YOUNG did not participate in the decision.

The plaintiffs are farmers who claim that an aerial herbicide drifted onto their farms and damaged their cotton crops. The defendant is Helena Chemical Company, which oversaw the aerial application of herbicide that the farmers blame for the damage. The district court granted summary judgment for Helena, but the court of appeals reversed. This Court is now asked whether the evidence that Helena's application of herbicide caused the plaintiffs' injury raises the genuine

issue of material fact required to survive summary judgment. As explained below, we agree with the district court that it does not. The court of appeals' judgment is affirmed in part and reversed in part, and the summary judgment for Helena is reinstated.

I.

A.

The plaintiffs farm cotton in Mitchell County.[1] Defendant Helena distributes an herbicide called Sendero, which is primarily used to kill mesquite trees. Sendero contains two active ingredients—clopyralid and aminopyralid. These ingredients are used in many other products, but their use in combination is apparently unique to Sendero.

The plaintiffs allege that Helena supervised an aerial application of Sendero over several non-contiguous parcels of the Spade Ranch, a large ranch spanning parts of Coke, Sterling, and Mitchell Counties. Two planes sprayed roughly 3,300 gallons of Sendero over several days in July 2015. The spray was released from eight to ten feet above the treetops. The plaintiffs allege that the herbicide drifted onto their properties and damaged cotton crops planted in 2015 and 2016.

The plaintiffs blame Helena for reduced crop yields in over 14,000 acres of cotton fields scattered across hundreds of square miles of Mitchell County. These fields are located between 1.8 miles and 25 miles from the places on the Spade Ranch where Helena sprayed Sendero. The precise locations of the allegedly affected fields are not

[1] The plaintiffs are Robert Cox, James Cox Trust, Cox Farms, Tanner Cox, Loren Rees, Tyson Price, Russell Erwin, David Stubblefield, Rushnell Farms, Brooks Wallis, Hoyle & Hoyle, and Jack Ainsworth.

entirely clear from the record, which contains only a high-altitude map showing color-coded parcels identifying most of the plaintiffs' fields. The placement of the fields follows no discernable pattern. Some fields are bunched together, while some are isolated by many miles.

After Helena's application of Sendero over the Spade Ranch, the plaintiffs complained of crop damage. Texas Department of Agriculture (TDA) inspector Cory Pence investigated the incident in July 2015. He concluded that the Spade Ranch application of Sendero was a possible cause of the plaintiffs' crop damage. He claimed to find "markers" for both aminopyralid and clopyralid. He was unable, however, to identify a "consistent pattern" or "drift pattern" of crop damage over this large area. Pence conducted only a visual inspection, and TDA never conducted any laboratory tests for aminopyralid or clopyralid. When deposed, Pence could not explain the difference between markers for aminopyralid and clopyralid.

The plaintiffs allege that Sendero is highly toxic to cotton plants and should only be applied when the risk of drift onto nearby, sensitive areas is minimal. Warnings on Sendero's label say as much, and Helena does not contend otherwise. The plaintiffs allege that weather conditions—including wind, temperature, and humidity—were such that Sendero should not have been sprayed on the days in question. They further allege that application of the herbicide at an inappropriately high altitude resulted in greater drift onto neighboring properties.

The plaintiffs harvested and sold what they could from their 2015 crops. They gathered only limited evidence of the herbicide damage,

either at the time they noticed it or at the time of harvest. Notably, many of the plaintiffs filed insurance claims attributing their crop losses to drought or other adverse weather. The record contains three photographs of allegedly damaged crops. These photos come from unidentified fields and were taken on unknown dates.[2]

B.

The plaintiffs sued Helena and other defendants in 2015 in Mitchell County. They sought recovery under various theories for the reduced cotton crop produced by their land in 2015 and 2016, as well as mental-anguish damages and punitive damages.

Helena filed several dispositive motions. The district court granted Helena's motion for partial summary judgment as to mental anguish, gross negligence, and punitive damages. Helena also filed a no-evidence motion for summary judgment, arguing that no evidence supported the element of causation essential to recovery under all the plaintiffs' claims. Helena simultaneously filed a motion to strike the plaintiffs' expert opinions on causation, arguing that the opinions were unreliable and therefore inadmissible. Helena further contended that even if the experts' opinions were admitted, they would constitute no evidence of causation, requiring summary judgment for Helena.

[2] Plaintiffs' experts Ronald Halfmann and Tracey Carrillo, whose opinions are discussed below, attested that they had reviewed "hundreds" of photographs of crop damage in Mitchell County, but these photographs are not in the record, which is silent as to the dates, the precise locations, or any other specifics regarding the crop damage depicted in the photographs reviewed by the experts.

The plaintiffs retained five experts whose testimony bears on causation: Ronald Halfmann, Tracey Carrillo, Daylon Royal, Paul Rosenfeld, and Paul Ward. Their affidavits, expert reports, and deposition testimony are part of the record and were the focus of the no-evidence summary-judgment motion and the motion to strike.[3] The experts did not visit the affected fields or collect cotton samples. They relied on reports from TDA inspector Pence and from the plaintiffs, as well as on other available information.

Ronald Halfmann is a former inspector with the TDA. He identified himself as an expert "in agricultur[al] application of pesticides" with "extensive experience investigating pesticide drift." He opined that Helena breached the standard of care for use of aerial herbicides, that weather conditions and faulty application techniques caused excessive drift, and that the Spade Ranch application of Sendero damaged 15,000 acres of cotton as claimed by the plaintiffs. He stated that Sendero can drift up to 20 miles under hazardous weather

[3] A separate group of plaintiffs sued Helena in Reagan County. The lawyers in that case and in this case agreed that certain expert affidavits and depositions could be used in both cases. Although they did not so argue in the district court, the plaintiffs now contend that this Rule 11 agreement restricted Helena's right to challenge the reliability of the experts' testimony. We disagree. We read the agreement as intended to eliminate needless duplication of discovery and to permit the use of the expert opinions insofar as they recite the experts' "qualifications and experience," the "methodology employed" by the experts, and the "scope and extent" of the opinions. We do not read the agreement as intended to waive Helena's right to challenge the substance of the experts' opinions as unreliable. The attorneys who executed the agreement did not argue in the district court that the agreement has the effect now claimed.

conditions and that, in his opinion, only a large application of herbicide would have caused the damage reported by the plaintiffs.

Tracey Carrillo is an agronomist and entomologist. He has many years of experience in cotton farming and herbicide drift. In his opinion, damage from Sendero occurred in all the plaintiffs' fields. He based this opinion on the Sendero label, plant tissue samples that were tested for clopyralid and aminopyralid, observations from the farmers, the report of TDA investigator Pence, and other information. He explained that damage to cotton fields from Sendero is prolonged and substantial and that damage from aerial-drift events is widely known and accepted. He opined that crop damage in 2015, 2016, and 2017 was consistent with a large-scale application of Sendero. He concluded, based on his review of the evidence, including lab test results, that "there is no doubt that [the plaintiffs'] cotton was contaminated from spray drift of applications of Sendero conducted by [Helena]."

Daylon Royal is a crop-dusting pilot. He also addressed physical drift. He advised Carrillo that it was highly probable that Helena's application of Sendero had caused the herbicide to drift onto the plaintiffs' fields because of wind and temperature conditions at the time. He relied on a "rule of thumb" that as much as 50% of aerially applied pesticide drifts away from the targeted field.

Paul Rosenfeld is an environmental chemist who has studied the effect of Sendero on crops. He provided evidence that Sendero results in long-term damage to cotton fields. Based on Pence's TDA report and other information, Rosenfeld concluded that Sendero drifted onto the plaintiffs' farms and damaged their cotton crops. He testified that

Helena's 2015 Sendero application would remain in the soil and damage the plaintiffs' crops in 2016.

Paul Ward grew bean plants in soil samples taken from Mitchell County and compared them to samples grown in potting soil. He had no prior experience evaluating herbicide exposure and no experience with Sendero, clopyralid, or aminopyralid. He did not know whether any scientific studies confirmed that his methods were reliable to show what actually happens in cotton fields.

The district court held an extensive hearing on the motion to strike the expert testimony. It later granted the summary-judgment motion and the motion to strike and rendered judgment for Helena. The court of appeals reversed, in large part. 630 S.W.3d 234, 249 (Tex. App.—Eastland 2020). It reasoned:

> Although Halfmann, Carrillo, and Rosenfeld could not specifically trace the purported drift of clopyralid from the Spade Ranch to Appellants' cotton fields, they provided a reliable scientific basis for their opinions that Appellants' cotton crops were damaged by a large-scale aerial application of clopyralid to the south of Appellants' fields. Relying on Pence's investigation and observations that Helena's aerial application of Sendero, which was done in conditions that exacerbated drift, was the only such large-scale application at the relevant time and place, they concluded that the damage to Appellants' cotton crops was caused by Helena. We see no analytical gap in such a conclusion. We sustain Appellants' second issue as to Appellants' expert witnesses with one exception: that exception being Royal's attempt to offer an opinion that Sendero drifted from Helena's application site to Appellants' fields.

Id. at 243–44. Because it concluded that the experts' evidence was reliable and therefore admissible, the court of appeals also concluded

that there was evidence of causation sufficient to survive summary judgment. *Id*. at 244–45.

The court of appeals did, however, agree with Helena that it was entitled to partial summary judgment as to claims for mental anguish and punitive damages. The plaintiffs do not challenge the court of appeals' affirmance of summary judgment in this regard. After affirming in part and reversing in part, the court of appeals remanded the case to the district court for further proceedings. *Id*. at 249. Helena petitioned for review in this Court, and we granted the petition.

II.

A.

A party may move for summary judgment, after adequate time for discovery, "on the ground that there is no evidence of one or more essential elements of a claim or defense on which an adverse party would have the burden of proof at trial." TEX. R. CIV. P. 166a(i). The court must grant such a "no-evidence" motion unless the non-moving party responds with "evidence raising a genuine issue of material fact." *Id.* Appellate courts review summary judgments de novo. *Valence Operating Co. v. Dorsett*, 164 S.W.3d 656, 661 (Tex. 2005). In so doing, we examine the evidence in the light most favorable to the non-moving party, indulging reasonable inferences and resolving doubts against the party seeking summary judgment. *City of Keller v. Wilson*, 168 S.W.3d 802, 824 (Tex. 2005).

The issue before this Court is whether the plaintiffs' evidence raised a genuine issue of material fact on causation, which is an essential element of all the plaintiffs' claims on which they bear the

burden of proof. To survive summary judgment, the plaintiffs' causation evidence must raise a genuine fact issue as to whether it is more likely than not that Helena's application of Sendero in July 2015 caused a reduced yield of cotton and therefore reduced income for the farmers.

The central inquiry—viewed either through the lens of a motion to strike the evidence or a summary-judgment motion—is whether the plaintiffs' experts offered *reliable* evidence of causation. As for the motion to strike, "[a]dmission of expert testimony that does not meet the reliability requirement is an abuse of discretion." *Cooper Tire & Rubber Co. v. Mendez*, 204 S.W.3d 797, 800 (Tex. 2006). As for the summary-judgment motion, if the expert's opinion is not reliable, it is no evidence and will not defeat a no-evidence motion for summary judgment. *Seger v. Yorkshire Ins. Co.*, 503 S.W.3d 388, 410 n.23 (Tex. 2016) ("Unreliable expert testimony is legally no evidence."); *Merrell Dow Pharms., Inc. v. Havner*, 953 S.W.2d 706, 713 (Tex. 1997) ("If the expert's scientific testimony is not reliable, it is not evidence."). To resolve this appeal, we will assume the experts' opinions have been admitted, and we will ask whether these opinions are reliable evidence of causation sufficient to overcome Helena's motion for summary judgment.

A witness may be qualified to testify as an expert based on his "knowledge, skill, experience, training, or education." TEX. R. EVID. 702. Although an expert witness need not always be formally credentialed as a scientist, expert testimony on scientific matters—such as the aerial drift of herbicide particles or the effect of herbicide exposure on plants—naturally must be "grounded 'in the methods and procedures of science.'"

E.I. du Pont de Nemours & Co. v. Robinson, 923 S.W.2d 549, 557 (Tex. 1995) (quoting *Daubert v. Merrell Dow Pharms., Inc.*, 509 U.S. 579, 590 (1993)); *see also Gammill v. Jack Williams Chevrolet, Inc.*, 972 S.W.2d 713, 721–22 (Tex. 1998) (discussing reliability analysis for scientific opinion based on witness's skill, experience, or training). Unreliable testimony, by contrast, includes that which "is no more than 'subjective belief or unsupported speculation.'" *Robinson*, 923 S.W.2d at 557 (quoting *Daubert*, 509 U.S. at 590). "If the expert brings only his credentials and a subjective opinion, his testimony is fundamentally unsupported and therefore of no assistance to the jury." *Cooper Tire*, 204 S.W.3d at 801. The mere *ipse dixit* of the expert—that is, asking the jury to take the expert's word for it because he is an expert—will not suffice. *See City of San Antonio v. Pollock*, 284 S.W.3d 809, 816 (Tex. 2009). Instead, an expert's conclusions must have a reliable basis other than the expert's say-so. And "if no basis for the [expert] opinion is offered, or the basis offered provides no support, the opinion is merely a conclusory statement and cannot be considered probative evidence." *Id.* at 818.

In determining the reliability of expert testimony, courts must consider not just whether the expert's methods are grounded in science, but also whether the data to which the expert applies his methods are reliable. "If the foundational data underlying opinion testimony are unreliable, an expert will not be permitted to base an opinion on that data because any opinion drawn from that data is likewise unreliable." *Havner*, 953 S.W.2d at 714. Moreover, "an expert's testimony is unreliable even when the underlying data are sound if the expert draws

conclusions from that data based on flawed methodology. A flaw in the expert's reasoning from the data may render reliance on a study unreasonable and render the inferences drawn therefrom dubious." *Id.* Likewise, "if an expert's opinion is based on certain assumptions about the facts, we cannot disregard evidence showing those assumptions were unfounded." *City of Keller*, 168 S.W.3d at 813.

We have also recognized that expert testimony is unreliable if "there is simply too great an analytical gap between the data and the opinion proffered." *Gammill*, 972 S.W.2d at 727 (quoting *Gen. Elec. Co. v. Joiner*, 522 U.S. 136, 146 (1997)). "We are not required . . . to ignore fatal gaps in an expert's analysis or assertions that are simply incorrect." *Volkswagen of Am., Inc. v. Ramirez*, 159 S.W.3d 897, 912 (Tex. 2005). "Analytical gaps may include circumstances in which the expert unreliably applies otherwise sound principles and methodologies, the expert's opinion is based on assumed facts that vary materially from the facts in the record, or the expert's opinion is based on tests or data that do not support the conclusions reached." *Gharda USA, Inc. v. Control Sols., Inc.*, 464 S.W.3d 338, 349 (Tex. 2015) (citations omitted).

Augmenting the above standards, our decision in *Robinson* identified six non-exclusive factors courts may consider in determining whether expert testimony is reliable:

1. the extent to which the theory has been or can be tested;
2. the extent to which the technique relies upon the subjective interpretation of the expert;
3. whether the theory has been subjected to peer review and/or publication;
4. the technique's potential rate of error;

5. whether the underlying theory or technique has been generally accepted as valid by the relevant scientific community; and

6. the non-judicial uses which have been made of the theory or technique.

923 S.W.2d at 557. The "*Robinson* factors" are not always determinative when assessing an expert's reliability, but even when they are not, the court must be provided with some way of assessing the reliability of objected-to expert testimony, apart from the expert's credentials and say-so. *Gammill*, 972 S.W.2d at 726.[4]

B.

"[T]he ultimate issue . . . in a toxic tort case . . . is always specific causation—whether the defendant's product caused the plaintiff's

[4] Amicus curiae High Plains Wine & Food Foundation, unlike the parties, relies heavily on this Court's decision in *Pitchfork Land & Cattle Co. v. King*, 346 S.W.2d 598 (Tex. 1961). *Pitchfork Land* assessed expert testimony in an aerial-drift case, but unlike the amicus, we do not understand *Pitchfork Land* to require a unique "standard for measuring the legal sufficiency of causation evidence in crop-dusting cases." Rather than cordoning off crop-dusting cases into a special category, we should read *Pitchfork Land* in conjunction with our more recent caselaw on expert testimony on scientific matters in toxic-tort cases, in which we have established more searching standards for evaluating the reliability of any such testimony. *Robinson*, in particular, was a landmark 1995 case that largely adopted the federal standards articulated in *Daubert* and signaled the beginning of this Court's modern approach to expert testimony in cases alleging exposure to toxic substances. *Robinson* involved facts remarkably similar to those here; the allegation was crop damage caused by fungicide. It would be quite odd for one approach to the reliability of expert causation evidence to apply in a case about crop damage from herbicides, but another approach to apply in a case about crop damage from fungicides. The reality is that cases like *Daubert* and *Robinson* marked an important development in the courts' approach to these matters, which has since become settled law. It should be unremarkable to observe that many earlier cases, including a 1961 spray-drift case, do not fully reflect the approach to expert testimony required by *Robinson* and later cases.

injury." *Bostic v. Georgia-Pacific Corp.*, 439 S.W.3d 332, 351 (Tex. 2014). It is important to emphasize at the outset that the plaintiffs' injury here is not "damage" to cotton plants, such as wilted leaves. Instead, the injury for which the plaintiffs seek recovery is a financial one—decreased revenue from a reduced yield of cotton at harvest. It is therefore not enough for the plaintiffs to show that drifting herbicides reached their plants and "damaged" them in some way. Instead, they must show that Helena's application of Sendero caused their plants to yield less cotton at harvest. They need not *prove* this at the summary-judgment stage, however. To survive Helena's motion for summary judgment, the plaintiffs must proffer some evidence creating a genuine fact issue as to whether Helena's application of Sendero caused the reduced crop yield. *Draughon v. Johnson*, 631 S.W.3d 81, 88 (Tex. 2021).

The plaintiffs suggest that, apart from the expert testimony on which they rely, the lay opinions of the farmers themselves about the source of their crop failure can provide evidence of causation sufficient to survive summary judgment. In the context of this case, we disagree. "Expert testimony is required when an issue involves matters beyond jurors' common understanding." *Mack Trucks, Inc. v. Tamez*, 206 S.W.3d 572, 583 (Tex. 2006); *accord Gharda*, 464 S.W.3d at 348. Determining whether a particular application of aerial herbicide substantially contributed to the failure of crops miles away requires knowledge and analysis of scientific matters beyond the competence of laymen.[5] It goes

[5] *See, e.g.*, *Cerny v. Marathon Oil Corp.*, 480 S.W.3d 612, 620 (Tex. App.—San Antonio 2015, pet. denied) (stating that the requirement of expert

without saying that plants, like all living things, become sickly or die for any number of natural and man-made reasons. And the expected aerial migration of herbicidal particles over vast distances due to weather conditions and spray techniques is plainly not a matter with which laymen are generally familiar. The plaintiffs were not offered as expert witnesses, and their lay opinions, standing alone, are insufficient to survive summary judgment.

As another initial matter, Helena argues that the required evidentiary showing of toxic exposure at a sufficient dose must be made for each "field" for which the plaintiffs seek recovery. According to Helena, "the term 'field' is used by the [U.S. Department of Agriculture's] Farm Services Agency to designate the smallest unit of land for agricultural production." Helena asks us to require discrete proof of causation as to each such "field" at the summary-judgment stage. Although the U.S.D.A.'s field designations provide a convenient way to categorize vast swaths of farmland, we cannot say that as a matter of law every plaintiff in a crop-loss case must proffer field-by-field proof using the U.S.D.A.'s field boundaries. To be sure, proof of toxic exposure at one spot on a farmer's land is not proof of exposure throughout all of the farmer's land. The plaintiff must show causation

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testimony is "obvious" where the "claims arise out of alleged emissions and migration of hazardous substances"); *Foust v. Estate of Walters*, 21 S.W.3d 495, 505 (Tex. App.—San Antonio 2000, pet. denied) ("A negligence claim against an aerial applicator [of herbicide] must be established with expert testimony."); *Hager v. Romines*, 913 S.W.2d 733, 734–35 (Tex. App.—Fort Worth 1995, no writ) ("We find that the standard of care in the aerial application of herbicide, as well as the violation of such standard, must be established by expert testimony.").

for the entire area for which he seeks recovery, and using the U.S.D.A's field designations may be a useful way to do so. But how a plaintiff goes about making that proof—or how a defendant goes about opposing it—need not in every case invoke the field boundaries defined by the federal government.

C.

In a toxic-tort case alleging *human* exposure to harmful substances, the "minimal facts necessary to demonstrate specific causation" include "[s]cientific knowledge of the harmful level of exposure to a chemical, plus knowledge that the plaintiff was exposed to such quantities." *Builder Servs. Grp., Inc. v. Taylor*, No. 03-18-00710-CV, 2020 WL 5608484, at *6 (Tex. App.—Austin Sept. 17, 2020, pet. denied); *see also Robinson*, 923 S.W.2d at 557. What is true of injured plaintiffs in a toxic-exposure case is also true of injured crops in an herbicide-drift case. There must be reliable evidence that the failed crops for which recovery is sought were more likely than not (1) exposed to the harmful chemical, (2) at levels of exposure sufficient to cause the lost yields alleged. In addition, there must be reliable evidence ruling out other plausible alternative causes of the lost yields. *Bostic*, 439 S.W.3d at 350; *Havner*, 953 S.W.2d at 720. Without some scientifically reliable evidence of these facts, the evidence of causation offered does not rise above subjective belief and will not survive a no-evidence motion for summary judgment. *Robinson*, 923 S.W.2d at 557.

We turn first to whether the plaintiffs' evidence that their crops were exposed to Helena's Sendero was sufficient to survive summary judgment. Although the "field-by-field" proof demanded by Helena is

not required, the plaintiffs must nevertheless come forward with reliable evidence of causation for any area for which they seek recovery. One obvious way to begin to show toxic contamination over a widespread area in such a case would be laboratory test results from spots throughout the allegedly affected area, coupled with reliable evidence that the tested areas are representative of the whole area for which damage is claimed. Yet rather than proffer lab testing confirming the presence of Sendero in representative areas, the plaintiffs offer only three positive lab results indicating the presence of clopyralid at identifiable locations. Three or four other tests indicated the presence of clopyralid at unknown locations within the allegedly damaged acreage.

No test indicated the presence of aminopyralid, the other active ingredient in Sendero. The plaintiffs' experts acknowledged that herbicides other than Sendero contain clopyralid. Thus, the laboratory tests do not establish the presence of Sendero—as opposed to other herbicides—anywhere in the plaintiffs' fields. Nevertheless, the plaintiffs' experts also stated that aminopyralid often does not show up in laboratory testing because it is present in such small quantities. Deficiencies in aminopyralid testing are a matter within the expertise of Halfmann and Carrillo, and their opinions in this regard qualify as some evidence, at the summary-judgment stage, that (1) lab tests indicating positive results for clopyralid can indicate the presence of Sendero, and (2) lab testing will not necessarily distinguish Sendero from other herbicides.

The problem with the plaintiffs' lab-testing evidence, however, is that their witnesses offered no reliable way to extrapolate from the small number of positive lab tests any conclusion at all about the presence of clopyralid—much less Sendero[6]—in the rest of the vast and scattered acreage for which recovery is sought. Even if the lab results are some evidence indicating Sendero's presence in the areas with positive test results, they are no evidence that Sendero was present anywhere else.[7]

This is not to say that the plaintiffs needed to test every field in order to survive summary judgment. But they do need to show, using reliable methodology, that the acreage for which they actually have the kind of hard scientific data our cases typically require is representative

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[6] TDA inspector Pence testified that he found "markers" for clopyralid and aminopyralid in the plaintiffs' fields, and it appears the plaintiffs' experts may have relied on this statement in concluding that Sendero was present. But Pence could not explain, at his deposition, what damage to a plant is a "marker" of aminopyralid, as opposed to other herbicides. And none of the plaintiffs' experts—who relied heavily on pictures of the plants and reports from visual inspections by the farmers—provided an additional basis for concluding that the plants exhibited damage from Sendero, as opposed to other products. Carrillo testified that a visual inspection, even by an agronomist like himself, cannot distinguish between cotton plants exposed to Sendero and plants exposed to products containing only clopyralid or other herbicides. Plaintiffs' experts Ward, Rosenfeld, and Halfmann agreed. Helena offered unrebutted evidence that clopyralid is found in numerous herbicides, including many herbicides used more commonly in the area during the summer months than Sendero. Halfmann confirmed that herbicidal treatment of mesquite by multiple land owners would likely occur during the summer.

[7] As for the sites that tested positive for clopyralid, the causation evidence is insufficient to survive summary judgment for the reasons explained in Parts II.D and II.E, even if the positive clopyralid test is some evidence of Sendero's presence at these sites.

of the larger area for which they seek recovery.[8] They could do so, perhaps, by showing that the location of the positive clopyralid tests relative to the aerial Sendero application are such that the herbicide must have drifted through other, untested areas before reaching the tested area. They did not attempt to do this. Nor have they made any other effort to demonstrate with reliable methodology that positive lab results in a few places are indicative of the wider presence of clopyralid throughout the affected area.

To help fill the gap in testing data, the plaintiffs could have proffered a recognized model of the herbicide's drift through the air onto the allegedly affected properties. Such evidence could provide a reliable indication that Helena's product actually reached the allegedly damaged areas. The plaintiffs' experts did not attempt to do this, however. They acknowledged that scientific models of aerial drift exist, but they did not employ these models or make any effort to recreate the aerial drift that would have occurred from the Spade Ranch given the weather conditions on July 1–4, 2015. They acknowledged that aerial drift typically occurs in a predictable pattern, in which fields closer to the source exhibit more

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[8] *See Plunkett v. Conn. Gen. Life Ins. Co.*, 285 S.W.3d 106, 115–17 (Tex. App.—Dallas 2009, pet. denied) (affirming no-evidence summary judgment where expert relied on positive mold test of furniture from one unit of a 241-unit apartment complex, purported to extrapolate that test to "all property from all units," and failed to provide "empirical evidence or methodology" explaining the validity of the extrapolation); *Purina Mills, Inc., v. Odell*, 948 S.W.2d 927, 934, 937 (Tex. App.—Texarkana 1997, pet. denied) (holding that expert testimony was insufficient where plaintiff claimed 200 cattle were injured by defendant's feed due to metal contamination, only two or three cattle were diagnosed with "hardware disease," and experts had failed to conduct "a methodological or technical study of all the cattle or representative samples of the feed").

damage than those farther away. And they acknowledged that the scattered pattern of steady damage in this case does not fit the usual aerial-drift model. Yet the only analysis provided of the drift pattern is that there was a heavy south wind on the days in question and the affected fields are north of the Spade Ranch.[9] This observation certainly indicates the likelihood that some Sendero floated in the general direction of the plaintiffs' fields, but it is no evidence of causation because it amounts to no more than speculation that Sendero actually landed on these particular, scattered fields in a concentration sufficient to cause the crop damage and attendant loss of yield alleged.

The only testimony offered about aerial-drift patterns was inconclusive or speculative. Carrillo stated that there was no discernable pattern of harm to the damaged crops that would be "a common characteristic of physical drift." Halfmann similarly testified that the "patchiness of the damage" in this case could not "scientifically . . . be explained by anyone" under a theory of drift patterns or a drift mechanism, and that the observed "sporadic effects" were "unexplainable." The experts essentially expressed the view that aerial drift *must have* occurred here because of the widespread damage alleged—even though the damage pattern was not consistent with typical drift patterns. But their conclusions in this regard lack a reliable foundation grounded in science and amount to no more than speculation. They offered no drift model that had been tested, cited no studies

[9] Pence, who personally investigated the incident, was likewise unable to identify any "consistent pattern" or "drift pattern" of crop damage over this large area.

supporting their analysis, offered no reasoned discussion of the potential rate of error of their analysis, gave no indication that their approach to understanding aerial drift had been accepted in the scientific community, and could point to no non-judicial use of their methods. *Robinson*, 923 S.W.2d at 557. Thus, none of the *Robinson* factors are present, and the plaintiffs offer no alternative basis on which a court could find that their expert testimony on aerial-drift patterns is scientifically reliable. Just as in *Robinson*, the experts failed to present a scientifically valid model that could explain why there was "no consistent pattern of damage to the trees," or in this case, the cotton crops. *Id.* at 551.

We do not suggest that precision of proof is required in such a case. Nor do we suggest a rigid requirement that such cases must always be proved with scientific modelling of the aerial-drift pattern or with any other precise category of evidence. But it defies reason to suggest that Helena's aerial application of Sendero landed in roughly equal quantities on all 111 fields scattered across hundreds of square miles of Mitchell County. Some scientific attempt to model where the Sendero probably drifted, in what amounts, and why, could at least have provided rational estimates of how much of Helena's Sendero, if any, reached these scattered fields. This information might enable the plaintiffs to establish that Helena's Sendero substantially contributed to their losses across the entire area. Or it might narrow the area for which the plaintiffs can obtain recovery. Either way, assignment of liability to Helena could be based on a rational analysis bearing some indicia of reliability—not on the kind of assumptions and speculation we

have repeatedly deemed insufficient. *See, e.g.*, *Marathon Corp. v. Pitzner*, 106 S.W.3d 724, 729 (Tex. 2003); *Cooper Tire*, 204 S.W.3d at 801–07; *Burroughs Wellcome Co. v. Crye*, 907 S.W.2d 497, 499–500 (Tex. 1995).[10]

D.

A scientific model of the aerial drift—which the plaintiffs' experts did not attempt to offer—could also have provided evidence on another important facet of causation in toxic-exposure cases: the dosage. We have often articulated the requirement in similar cases that the plaintiff establish with evidence the dosage required to produce the alleged injury. For example, in *Robinson*, we held that an expert's testimony regarding contamination of pecan trees by fungicide was unreliable because the expert had "no knowledge as to what amount or concentration of [contaminants] would damage pecan trees." 923 S.W.2d at 559. Similarly, in *Cooper Tire*, we held that an expert's theory that a tire suffered a manufacturing defect because of wax contamination was unreliable, in part because the expert "conducted nothing in the nature of a *quantitative* analysis of wax contamination, such as calculating the amount of wax deposited on the skim stock or

[10] We do not purport to be aware of all possible methods of proof in cases such as this one. By suggesting that the plaintiffs might have raised a genuine fact issue on causation by proffering additional types of evidence, we do not hold that all plaintiffs in spray-drift cases must proffer such evidence to survive summary judgment.

the amount of wax necessary to cause a tire malfunction." 204 S.W.3d at 802.[11]

Later, in *Borg-Warner Corp. v. Flores*, we observed: "One of toxicology's central tenets is that 'the dose makes the poison.'" 232 S.W.3d 765, 770 (Tex. 2007). We rendered judgment for the defendant because "absent any evidence of dose, the jury could not evaluate the quantity of respirable asbestos to which [the plaintiff] might have been exposed or whether those amounts were sufficient to cause asbestosis." *Id.* at 771–72. Still later, in *Bostic*, we required proof of dose in mesothelioma cases, even though "relatively minute quantities of asbestos can result in mesothelioma." 439 S.W.3d at 338. The Court held that "proof of 'some exposure' or 'any exposure' alone will not suffice to establish causation." *Id.* Instead, "the dose must be quantified" because "[t]he essential teaching of *Flores* is that dose matters." *Id.* at 353, 360; *see also Abraham v. Union Pac. R.R.*, 233 S.W.3d 13, 21 (Tex. App.—Houston [14th Dist.] 2007, pet. denied) ("Knowledge of the *extent* of exposure to a potentially harmful substance is essential to any reliable expert opinion that the particular substance caused a disease.") (emphasis added).

Just as it was no answer in *Bostic* to say that any exposure to asbestos can harm a person, it is no answer here to say that any exposure to Sendero can harm cotton plants. Sendero's product label says that it is toxic to broad-leaf plants, which include cotton. And

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[11] *See also Pollock*, 284 S.W.3d at 820 n.33 ("[A]ny agent, even tap water, may produce a toxic effect at a sufficiently high level of exposure," while "even the deadliest poison is harmless at a sufficiently low level of exposure.").

Rosenfeld opined that exposure as diffuse as ten parts per billion could harm cotton. But there is simply no evidence at all in this case about the amount of Helena's Sendero that is alleged to have landed on the plaintiffs' crops miles away from the Spade Ranch. Halfmann conceded that he had not "reconstructed how much Sendero drifted to any specific cotton field." Nor is there any evidence that the unspecified amount of Sendero alleged to have landed on these fields was sufficient to make Helena's Sendero application a substantial factor in the lost crop yields suffered by the plaintiffs.

Crucially, while it is undisputed that very small amounts of Sendero can damage cotton plants, no evidence was proffered indicating how much exposure would be required to substantially contribute to the lost crop yields suffered by the plaintiffs. In fact, two of the plaintiffs' experts acknowledged that cotton plants showing signs of herbicide damage do not necessarily end up suffering reduced yield. According to Carrillo, "It could go either way. . . . They could or could not [have diminished yield]."[12] And none of the plaintiffs' experts knew how much exposure to Sendero would cause reduced crop yield.

The plaintiffs do not seek recovery for wilted leaves in July. They seek recovery for reduced cotton harvests months later, long after the application of Sendero to the Spade Ranch. The damaged crops were harvested and sold, although they did not produce the volume of cotton desired. Whether Helena's airborne Sendero was a substantial factor in

[12] Rosenfeld also acknowledged that exposure to clopyralid and resulting physical symptoms in cotton plants do not necessarily result in yield losses, especially at low levels of exposure.

causing the plaintiffs' lost yield depends in part on how much Sendero landed on the crops. It also depends on the presence of other factors contributing to reduced yields, such as unfavorable weather (for which the farmers made insurance claims seeking recovery of the same losses). Without knowing how much Sendero exposure was required to produce the plaintiffs' injuries and without a reliable estimate of how much Sendero landed on the fields, the factfinder could not even begin to reasonably determine whether Helena's Sendero—rather than something else, such as weather or other herbicides—caused the losses.

E.

This brings us to the question of plausible alternative causes. We have often said in similar cases that the plaintiff bears the burden to account for such causes. "We recognized in *Havner*, generally, that 'if there are other plausible causes of the injury or condition that could be negated, the plaintiff must offer evidence excluding those causes with reasonable certainty.'" *Bostic*, 439 S.W.3d at 350 (quoting *Havner*, 953 S.W.2d at 720); *accord JLG Trucking, LLC v. Garza*, 466 S.W.3d 157, 162 (Tex. 2015); *Transcon. Ins. Co. v. Crump*, 330 S.W.3d 211, 218 (Tex. 2010). And in *Robinson*, we observed that an expert's "failure to rule out other causes of the damage renders his opinion little more than speculation." 923 S.W.2d at 559; *see also Cooper Tire*, 204 S.W.3d at 807–08.

Alternative causes need not necessarily be ruled out *entirely*, however. In *Bostic*, we explained that in cases where multiple causes might have contributed to the injury, the expert does not have to completely eliminate the other causes as possible contributors. Instead,

the analysis of alternative causes must be sufficient for the factfinder to reasonably conclude that the defendant's conduct was a "substantial factor" in causing the injury. *Bostic*, 439 S.W.3d at 350–51. Nor must the plaintiff negate every conceivable alternative cause imagined by the defendant or the court. The testimony need only account for "other plausible causes *raised by the evidence*." *Transcon. Ins. Co.*, 330 S.W.3d at 218 (emphasis added).

Here, the evidence clearly indicates the plausibility of two alternative causes—weather and other herbicides. First, none of the experts accounted at all for the possible effect of weather on the reduced crop yields. On this record, the undisputed fact that many of the plaintiffs applied for insurance benefits for losses caused by weather confirms the need for their experts to account for this plausible alternative explanation for their losses. But the expert testimony makes no attempt to carry this burden.

Second, the record indicates that there could have been any number of other herbicide applications in the area, including efforts by individual property owners or by oil and gas operators. Halfmann acknowledged that herbicides other than Sendero are commonly used in the area during the summer. Most importantly, the record shows that there was another aerial Sendero application in the area. The record contains no indication that the experts investigated or analyzed the alternative reasons that clopyralid would have been detected in the tested fields—or that herbicide damage would have been visually observed—other than because of Helena's use of Sendero.

The plaintiffs' evidence thus fails to account for two plausible alternative causes—weather and other herbicides—either of which might wholly explain the damage or render the defendant's contribution trivial. *Bostic*, 939 S.W.3d at 351 (recognizing "that a defendant's trivial contribution to multiple causes will not result in liability").

In an effort to rule out other applications of clopyralid-containing herbicides as alternative causes, Carrillo and Halfmann observed that Helena's application in early July 2015 was the only application large enough to cause the heavy losses alleged by the plaintiffs. This idea—that only Helena's large application of Sendero on a windy day could account for the widespread losses alleged—appears throughout the plaintiffs' evidence and argument. But this approach largely assumes the matter to be proved. If we assume that all the reduced crop yields claimed in all the plaintiffs' scattered fields had one source, then Helena's application of Sendero in July 2015 is perhaps a likely culprit (although weather remains a possibility, and the plaintiffs' experts made no attempt to account for it). The law does not permit this assumption, however.

Instead, the law acknowledges the reality that an injury may have many plausible sources, and it puts the burden on plaintiffs to proffer evidence accounting for plausible alternative causes other than the defendant's conduct. When an injury may have multiple contributing causes, the plaintiff must at least show that the defendant's conduct was a substantial factor in causing the injury, taking into account any plausible alternative causes raised by the evidence. *Bostic*, 439 S.W.3d at 350–51; *Transcon. Ins. Co.*, 330 S.W.3d at 218. Here, the

plaintiffs' experts failed altogether to account for the potential contribution of plausible alternative causes—such as other herbicides or weather—to the plaintiffs' reduced crop yields.[13]

The plaintiffs cannot account for plausible alternative causes of reduced cotton harvests in the fall and winter merely by demonstrating crop damage in July.[14] There must instead be an affirmative showing

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[13] Carrillo acknowledged that expert testimony in this case would need to exclude "other sources for the possible damage that the plaintiffs are alleging in this case" but that he did not do so. Rosenfeld testified that he did not know whether other applications of herbicides containing clopyralid could have been responsible for the damage to the plaintiffs' crops. Halfmann testified that he had not personally excluded other causes but that he relied on TDA inspector Pence in that regard. None of the plaintiffs' experts conducted an independent study or systematic review of other applications of herbicides during the relevant time period that might account for the plaintiffs' reduced harvest. Instead, they relied on Pence's TDA report. In this regard, Pence's report cannot fairly be characterized as scientifically reliable evidence. Pence testified that his investigation indicated a possibility, as opposed to a probability, of crop damage in Mitchell County that could be tied to Helena's application of Sendero. The only effort he made to eliminate other sources of the crop damage, over an area comprising hundreds of square miles, was to "drive up and down [four] roads looking for effects" from other applications and to ask some of the farmers if they saw anything. He did not meet with all the farmers or look into herbicide use by oil and gas operations in the area. Moreover, he ignored a TDA computerized database known as the PIER System, which tracks herbicide applications. Pence's investigation cannot be characterized as a scientific effort to account for other herbicide applications, much less weather. Importantly, Pence made no attempt to determine the cause of the plaintiffs' reduced crop yields later in the year. To be fair, such analysis was outside Pence's job description. The burden was on the plaintiffs and their attorneys to obtain expert testimony explaining the effect of the alleged Sendero exposure in July 2015 on crop yields several months later, taking into account other plausible explanations for reduced yield, such as weather or other herbicides.

[14] Again, the experts acknowledged that observed herbicide damage will not necessarily result in reduced crop yield. *See supra* at 23–24.

that the defendant's conduct was a substantial factor in causing the reduced crop yield at harvest time, notwithstanding plausible alternative explanations. Any such proof is lacking here. Other than the experts' say-so, the record is silent regarding the extent of the causal connection between the crop damage observed by Pence and the farmers in July and the reduced crop yield several months later. This "analytical gap" in the causal chain between the allegedly tortious conduct and the damages suffered requires summary judgment for Helena. *See Gharda*, 464 S.W.3d at 349; *Ramirez*, 159 S.W.3d at 912; *Gammill*, 972 S.W.2d at 727.

III.

For these reasons, the evidence of causation offered by the plaintiffs fails to raise the genuine issue of material fact necessary to survive summary judgment. The court of appeals' judgment is affirmed in part and reversed in part, and a take-nothing judgment on all claims is rendered.

James D. Blacklock
Justice

OPINION DELIVERED: March 3, 2023